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ABSTRACT

National Assessment of Educational Progress (NAEP) data for 9-, 13-, and 17-year-old students in the United States are provided, highlighting trends in science achievement from 1969-70 to 1990, mathematics achievement from 1973 to 1990, reading achievement from 1971 to 1990, and writing achievement from 1984 to 1990. Trends in academic proficiency for the nation and demographic subpopulations; trends in students' science and reading experiences and attitudes; patterns in school and home contexts for learning mathematics and reading; and trends in attitudes, behaviors, and instruction for writing are illustrated. Overall, the trends suggest few changes in educational achievement levels across the two decades covered by NAEP assessments. However, some declines in science and mathematics for 17-year-olds during the 1970s and generally low performance levels across several curriculum areas prompted reform efforts. Improvements occurred in science and mathematics during the 1980s at all three ages. Particularly for science, there is a pattern of decreased proficiency in the 1970s followed by recovery in the 1980s. Conversely, the reading results show that gains made by 9-year-olds in the 1970s eroded during the 1980s, while the performance of 13-year-olds remained constant. Writing achievement also showed some decline in the 1980s for eighth graders. Recent gains in mathematics and science achievement were partially offset by some losses in reading and writing. However, 17-year-olds improved their reading skills during the same period. Twenty-six figures and 64 data tables are provided. A procedural appendix summarizes procedures used in the 1990 trend assessments and provides 13 data tables. A data appendix provides 24 tables each showing science, mathematics, and reading trends; and 15 tables showing writing trends. (RLC)

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TRENDS IN ACADEMIC PROGRESS

Achievement of U.S. Students in Science, 1969-70 to 1990; Mathematics, 1973 to 1990; Reading, 1971 to 1990; and Writing, 1984 to 1990

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TRENDS IN ACADEMIC PROGRESS

Achievement of U.S. Students
in
Science, 1969-70 to 1990
Mathematics, 1973 to 1990
Reading, 1971 to 1990
Writing, 1984 to 1990

By
Ina V.S. Mullis • John A. Dossey • Mary A. Foertsch
Lee R. Jones • Claudia A. Gentile

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EXECUTIVE SUMMARY

INTRODUCTION The National Assessment of Educational Progress (NAEP) has been monitoring the scholastic achievement of our nation's 9-, 13-, and 17-year-olds since its inception in 1969. NAEP's 1990 trend data in science, mathematics, reading, and writing provide several avenues for describing changes in student achievement in each curriculum area, including results for specific assessment questions and summaries of achievement across the questions. For science, mathematics, and reading, NAEP has used proficiency scales that range from 0 to 500 to summarize student performance across questions and provide a basis for describing overall student achievement in each curriculum area. To "anchor" or give meaning to the results, student performance is characterized at five levels along the proficiency scales (i.e., 150, 200, 250, 300, and 350), and the percentages of students reaching each level are presented.[1] For writing, NAEP summarized achievement across a common set of writing assignments administered in three successive assessments and computed trends in performance on each of the tasks.

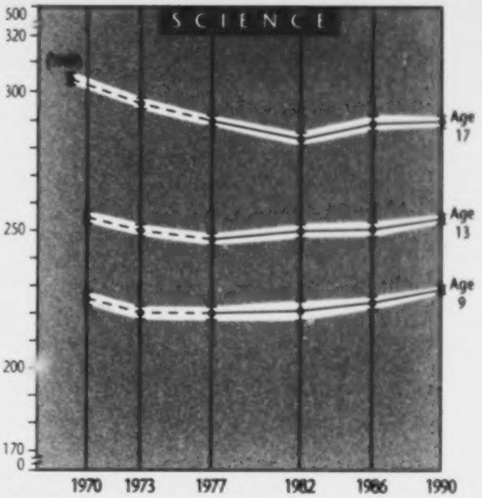
OVERALL TRENDS The overall trends in science, mathematics, reading, and writing are presented in FIGURE 1. In general, they suggest few changes in levels of educational achievement across the two decades covered by NAEP assessments. However,

---

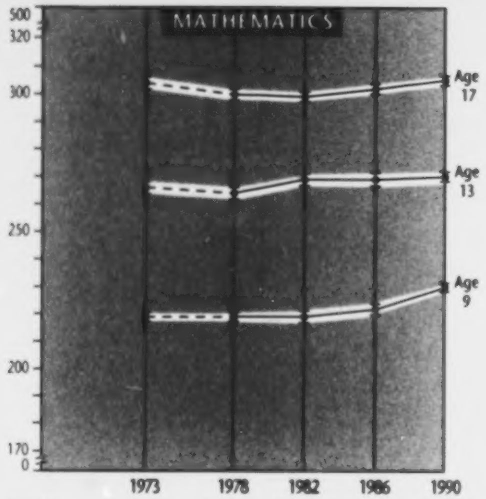
[1] The NAEP trend scales, each with a range of 0 to 500, were developed using item response theory (IRT) technology. The numerical values on each scale were established on the basis of student performance in the 1984 reading, 1986 science, and 1986 mathematics assessments. Each scale was set to span the range of student performance across all three ages in that subject-area assessment and to have a mean of 250.5 and a standard deviation of 50. To characterize levels of student performance, NAEP began by empirically identifying items that discriminated between adjacent pairs of proficiency levels. These items were grouped for each of the levels, and subject-area experts were then asked to interpret the items and describe what students at each level knew and could do compared to students at the next lower level.

FIGURE 1

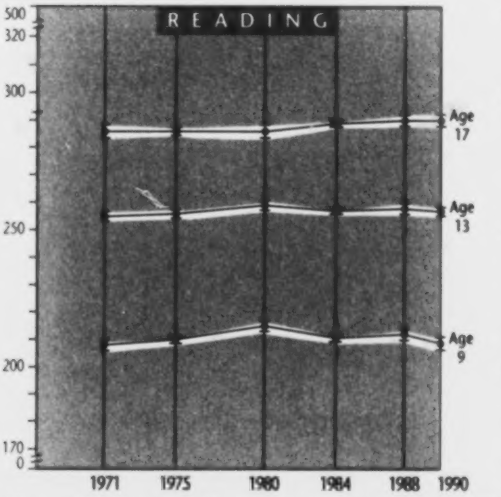
National Trends in Average Achievement in Science, Mathematics, Reading, and Writing



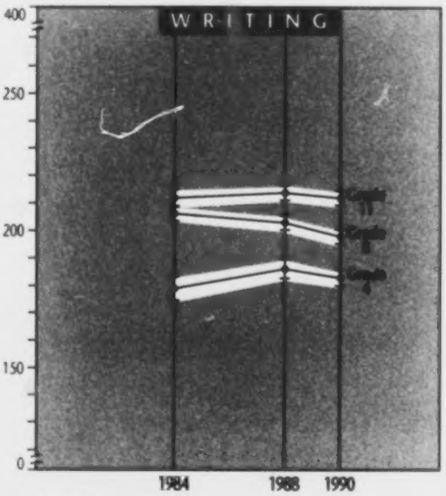
	1970	1973	1977	1982	1986	1990
Age 17	305(1.0)*	296(1.0)*†	290(1.0)†	283(1.2)*†	289(1.4)†	290(1.1)†
Age 13	255(1.1)	250(1.1)*†	247(1.1)*†	250(1.3)*	251(1.4)	255(0.9)
Age 9	225(1.2)	220(1.2)*†	220(1.2)*†	221(1.8)*	224(1.2)*	229(0.8)



	1973	1978	1982	1986	1990
Age 17	304(1.1)	300(1.0)*	299(0.9)*†	302(0.9)	305(0.9)
Age 13	266(1.1)*	264(1.1)*	269(1.1)	269(1.2)	270(0.9)†
Age 9	219(0.8)*	219(0.8)*	219(1.1)*	222(1.0)*	230(0.8)†



	1971	1975	1980	1984	1988	1990
Age 17	285(1.2)*	286(0.8)*	286(1.2)	289(0.6)	290(1.0)†	290(1.1)†
Age 13	255(0.9)	256(0.8)	259(0.9)	257(0.5)	258(1.0)	257(0.8)
Age 9	208(1.0)	210(0.7)	215(1.0)*†	211(0.7)	212(1.1)	209(1.2)



	1984	1988	1990
Grade 11	212(1.7)	214(1.4)	212(1.3)
Grade 8	206(1.4)*	203(1.3)*	198(1.3)
Grade 4	179(2.2)	186(1.8)	183(1.5)

⌶ 95 percent confidence interval. [- - -] Extrapolated from previous NAEP analyses.

* Statistically significant difference from 1990 and † statistically significant difference from 1969–70 for science, 1973 for mathematics, and 1971 for reading, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons. The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

against this long-term backdrop, it is possible to detect the signs of declines in science and in mathematics at age 17 during the 1970s that, along with generally low levels of performance across a number of curriculum areas, prompted *A Nation at Risk* and other calls for reform.[2] More encouraging, however, are the improvements in science and mathematics during the 1980s at all three ages. Thus, for science in particular, there is a pattern of decreased proficiency in the 1970s followed by recovery in the 1980s. Conversely, the reading results indicate that gains made by 9-year-olds in the 1970s eroded during the 1980s, while the performance of 13-year-olds remained constant. Writing achievement also showed some decline in the 1980s for eighth graders. It would seem that recent gains in mathematics and science achievement were partially offset by some losses in reading and writing. However, 17-year-olds did improve their reading skills during the same period.

SCIENCE. In 1990, science achievement was no better at ages 9 and 13, and somewhat worse at age 17 than in 1969-70.[3] At all three ages, across the 20-year span covered by the science assessments, performance declined significantly in the 1970s, but improved significantly during the 1980s. At ages 9 and 13, these recent gains returned performance to levels observed two decades ago. However, at age 17, average proficiency in 1990 remained significantly below that in 1969. In addition, science proficiency did not improve during the 1980s for the lower-performing 25 percent of the 17-year-olds.

MATHEMATICS. Average mathematics proficiency improved between 1973 and 1990 at ages 9 and 13; however, the trends at age 17 parallel those in science. For 17-year-olds, statistically significant declines in performance between 1973 and 1982 were followed by recovery during the 1980s to the original level of performance. At all three ages, students' average proficiency was significantly higher in 1990 than in 1978.

READING. The reading achievement of 9- and 13-year-olds in 1990 was unchanged from 1971, but 17-year-olds were reading better. However, the pattern at age 9 is the reverse of that found for science and for mathematics at age 17. Significant improvement during the 1970s has been all but eradicated by commensurate declines during the 1980s. Little change occured at age 13. Seventeen-year-olds showed relatively steady progress across the assessments.

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[2] National Commission on Excellence in Education, *A Nation at Risk* (Washington, DC: U.S. Department of Education, 1983).

[3] In the first science assessment, 17-year-olds were assessed in the 1968-69 school year, and 9- and 13-year-olds were assessed in the 1969-70 school year.

WRITING. Although writing achievement has been relatively stable across the six-year trend-reporting interval, there were some decreases during the 1980s for eighth graders. At grade 8, achievement was significantly lower in 1990 than in 1984, although the performance of fourth and eleventh graders showed little change.[4]

TRENDS IN LEVELS OF PROFICIENCY Information about student performance at various levels on the proficiency scales and trends in that performance across the assessments is available back to 1977 in science, to 1978 in mathematics, and to 1971 in reading. The results reveal similar findings across assessments in each of the curriculum areas. While students are learning facts and skills, few show the capacity for complex reasoning and problem solving. In 1990, performance across the levels remained similar to that observed

TABLE 1

Trends in Percentages of Students Performing At or Above Science Proficiency Levels

	AGE 9		AGE 13		AGE 17	
Level	**Percent in 1990**	**Difference from 1977**	**Percent in 1990**	**Difference from 1977**	**Percent in 1990**	**Difference from 1977**
350 Can infer relationships and draw conclusions using detailed scientific knowledge	0 (0.0)	0 (0.0)	0 (0.1)	0 (0.1)	9 (0.5)	1 (0.6)
300 Has some detailed scientific knowledge and can evaluate the appropriateness of scientific procedures	3 (0.3)	0 (0.4)	11 (0.6)	0 (0.8)	43 (1.3)	2 (1.6)
250 Understands and applies general information from the life and physical sciences	31 (0.8)	5 (1.1)*	57 (1.0)	8 (1.5)*	81 (0.9)	0 (1.2)
200 Understands some simple principles and has some knowledge, for example, about plants and animals	76 (0.9)	8 (1.4)*	92 (0.7)	6 (1.0)*	97 (0.3)	0 (0.4)
150 Knows everyday science facts	97 (0.3)	3 (0.7)	100 (0.1)	1 (0.2)	100 (0.2)	0 (0.2)

* Statistically significant difference at the .05 level. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. (No significance test is reported when the proportion of students is either > 95.0 or < 5.0.) When the proportion of students is either 0 or 100 percent, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent, and percentages less than .5 percent were rounded to 0.

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[4] NAEP has summarized writing trend results only since 1984. Although trends across the 1970s on individual writing assignments showed some mixed results, the overall picture was also one of relative stability.

in the 1970s. The few gains that have occurred were primarily in lower-level skills and basic concepts.

SCIENCE. As shown in TABLE 1, students' science understanding appears to be quite limited. Even at age 17, fewer than half the students in 1990 displayed some detailed knowledge and analytic understanding of scientific procedures. Further, 17-year-olds have shown little progress at any of the scale levels. In fact, across all three ages, performance has not changed at the upper two levels of the scale. The good news is found in the increased percentages of 9- and 13-year-olds performing at or above Levels 200 and 250, indicating that, compared to 1977, students at ages 9 and 13 demonstrated an increased grasp of general scientific information. These latter findings may reflect some impact from recommendations by educators to reestablish science in elementary schools.[5]

MATHEMATICS. The trends across proficiency levels for mathematics show a similar, albeit somewhat more encouraging, picture. For example, the results presented in TABLE 2 reveal that virtually all students appear to have grasped mathematics fundamentals. Besides the improvement in 1990 for 9-year-olds at Level 200 and for 9- and 13-year-olds at Level 250, a significantly larger percentage of 17-year-olds demonstrated the ability to go beyond whole numbers and use moderately complex reasoning skills (Level 300). Students are making initial strides toward improving their mathematics performance, although the findings indicate a challenge still exists in reaching targets discussed in conjunction with reforms in school mathematics.[6]

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[5] Iris Weiss, *Report of the 1985-86 National Survey of Science and Mathematics Education* (Research Triangle Park, NC: Research Triangle Institute, 1987).

Science for All Americans: A Project 2061 Report on Literacy Goals in Science, Mathematics, and Technology (Washington, DC: American Association for the Advancement of Science, 1989).

Educating Scientists and Engineers: Grade School to Grad School (Washington, DC: Office of Technology Assessment, 1988).

Rodger W. Bybee, et al., *Science and Technology Education for the Elementary Years: Frameworks for Curriculum and Instruction* (Washington, DC: The National Center for Improving Science Education, The NETWORK, Inc., and The Biological Sciences Curriculum Study, 1989).

[6] *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

Reshaping School Mathematics: A Philosophy and Framework for Curriculum (Washington, DC: Mathematical Sciences Education Board and National Research Council, National Academy Press, 1990).

Everybody Counts: A Report to the Nation on the Future of Mathematics Education, Lynn Steen, editor (Washington, DC: National Research Council, National Academy Press, 1989).

The National Science Board Commission of Precollege Education in Mathematics, Science, and Technology, *Educating Americans for the 21st Century* (Washington, DC: National Science Foundation, 1983).

TABLE 2

Trends in Percentages of Students Performing At or Above Mathematics Proficiency Levels

	AGE 9		AGE 13		AGE 17	
Level	**Percent in 1990**	**Difference from 1978**	**Percent in 1990**	**Difference from 1978**	**Percent in 1990**	**Difference from 1978**
350 Can solve multi-step problems and use beginning algebra	0 (0.0)	0 (0.0)	0 (0.1)	-1 (0.2)	7 (0.6)	0 (0.8)
300 Can compute with decimals, fractions, and percents; recognize geometric figures; solve simple equations; and use moderately complex reasoning	1 (0.3)	0 (0.3)	17 (1.0)	-1 (1.2)	56 (1.4)	5 (1.8)*
250 Can add, subtract, multiply, and divide using whole numbers, and solve one-step problems	28 (0.9)	8 (1.1)*	75 (1.0)	10 (1.6)*	96 (0.5)	4 (0.7)
200 Can add and subtract two-digit numbers and recognize relationships among coins	82 (1.0)	11 (1.3)*	99 (0.2)	4 (0.5)	100 (0.1)	0 (0.1)
150 Knows some addition and subtraction facts	99 (0.2)	2 (0.3)	100 (0.0)	0 (0.1)	100 (0.0)	0 (0.0)

* Statistically significant difference at the .05 level. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. (No significance test is reported when the proportion of students is either > 95.0 or < 5.0.) When the proportion of students is either 0 or 100 percent, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent, and percentages less than .5 percent were rounded to 0.

READING. As shown in TABLE 3, the results for reading are consistent with those in science and mathematics. Students appear to be mastering the lower-level skills, but few demonstrated competency with more sophisticated reading materials and tasks. A separate analysis of the constructed-response tasks included in the reading assessment indicated that many students, including the 17-year-olds, had great difficulty in expressing even one substantial thought in response to these types of questions about the passages that they read. Although a greater percentage of 17-year-olds reached Level 250 in 1990 than in 1971, the results at all three ages remained similar to those posted nearly two decades ago.

TABLE 3

Trends in Percentages of Students Performing At or Above Reading Proficiency Levels

Level		AGE 9		AGE 13		AGE 17	
		Percent in 1990	Difference from 1971	Percent in 1990	Difference from 1971	Percent in 1990	Difference from 1971
350	**Can synthesize and learn from specialized reading materials**	0 (0.1)	0 (0.1)	0 (0.1)	0 (0.1)	7 (0.5)	0 (0.6)
300	**Can find, understand, summarize, and explain relatively complicated information**	2 (0.3)	1 (0.3)	11 (0.6)	1 (0.8)	41 (1.0)	2 (1.4)
250	**Can search for specific information, interrelate ideas, and make generalizations**	18 (1.0)	3 (1.2)	59 (1.0)	1 (1.5)	84 (1.0)	6 (1.3)*
200	**Can comprehend specific or sequentially related information**	59 (1.3)	0 (1.6)	94 (0.6)	1 (0.8)	98 (0.3)	2 (0.4)
150	**Can carry out simple, discrete reading tasks**	90 (0.9)	-1 (1.0)	100 (0.1)	0 (0.3)	100 (0.1)	0 (0.1)

* The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. (No significance test is reported when the proportion of students is either > 95.0 or < 5.0.) When the proportion of students is either 0 or 100 percent, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent, and percentages less than .5 percent were rounded to 0.

WRITING. TABLE 4 shows the percentages of students who wrote at or above the "minimal" and "adequate" levels in response to tasks included in the 1990 trend assessment. Improvements over 1984 are identified with a single asterisk, while declines are double-asterisked.

Students writing at or above the minimal level displayed some of the elements needed to complete the task, while adequate or better responses included the information and ideas critical to accomplishing the underlying task required by the writing prompts. The substantially larger percentages of students achieving the minimal, as compared to the adequate, level indicate that students had great difficulty communicating effectively in writing.

The results indicate few changes since 1984. At grade 8, more students wrote adequate responses to the "Food on the Frontier" task, but, because of an increase in unsatisfactory responses, fewer reached the minimal level. In fact, there were more unsatisfactory and fewer minimal papers across a number of the writing assignments given to eighth graders. At grade 11, there was some decline in persuasive writing skills. Even for the high-school juniors, while a majority responded to the informative and persuasive tasks at the minimal level, few responded at the adequate level.

TABLE 4

Trends in Percentages of Students Performing At or Above the Minimal and Adequate Levels on Various Types of Writing Tasks

	AT OR ABOVE MINIMAL LEVEL			AT OR ABOVE ADEQUATE LEVEL		
Type of Task	**Grade 4**	**Grade 8**	**Grade 11**	**Grade 4**	**Grade 8**	**Grade 11**
INFORMATIVE						
Reporting:						
Plants	76 (1.5)**	—	—	37 (1.7)	—	—
XYZ Company	43 (1.4)	77 (1.4)**	—	39 (1.5)	70 (1.4)	—
Appleby House	76 (1.3)*	91 (0.8)	91 (0.9)	12 (1.1) **	39 (1.5)	50 (1.7)
Job Application	—	—	84 (1.2)	—	—	68 (1.2)
Analytic:						
Food on the Frontier	—	69 (1.2)**	82 (1.3)	—	16 (1.1)*	19 (1.2)*
PERSUASIVE						
Convincing Others:						
Spaceship	66 (1.5)	—	—	24 (1.4)	—	—
Dissecting Frogs	—	75 (1.2)**	—		12 (0.9)	
Space Program	—	—	82 (1.0)	—	—	28 (1.3)
Refuting an Opposing View:						
Radio Station	48 (1.8)	65 (1.5)**	—	13 (1.1)	25 (1.3)**	—
Recreation Opportunities	—	39 (1.9)**	66 (1.9)**	—	9 (1.0)	20 (1.1)
Bike Lane	—	—	64 (1.2)	—	—	20 (1.0)
NARRATIVE						
Flashlight	66 (2.6)	—	—	12 (1.5)	—	—

* Statistically significant improvement and **statistically significant decline between 1984 and 1990 at the .05 level. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

TRENDS IN PERFORMANCE BY RACE/ETHNICITY AND GENDER

The call for improved education and equal opportunity for all students is at the heart of many education reform recommendations. However, across the NAEP assessments, both Black and Hispanic students have, on average, demonstrated significantly lower proficiency than White students. Notwithstanding the fact that some students from these two minority groups performed at the highest levels on the NAEP scales and some White students performed at the lowest levels, in general these performance differences tend to be consistent across those ages assessed and curriculum areas.

Also, there have been differences in performance between the genders. Average proficiency levels for the 1990 trend assessments in science, mathematics, and reading are presented by race/ethnicity and gender in TABLE 5.

TABLE 5
Trends in Average Proficiency in Science, Mathematics, and Reading by Race/Ethnicity and Gender

	AGE 9		AGE 13		AGE 17	
SCIENCE	**Proficiency in 1990**	**Difference from 1970**	**Proficiency in 1990**	**Difference from 1970**	**Proficiency in 1990**	**Difference from 1969**
Nation	229 (0.8)	4 (1.4)	255 (0.9)	0 (1.4)	290 (1.1)	-15 (1.5)*
White	238 (0.8)	2 (1.2)	264 (0.9)	1 (1.2)	301 (1.1)	-11 (1.4)*
Black	196 (2.0)	17 (2.8)*	226 (3.1)	11 (3.9)	253 (4.5)	-5 (4.7)
Hispanic	206 (2.2)	14 (3.5)*	232 (2.6)	19 (3.2)*	262 (4.4)	0 (4.9)
Male	230 (1.1)	2 (1.7)	259 (1.1)	2 (1.7)	296 (1.3)	-18 (1.8)*
Female	227 (1.0)	4 (1.6)	252 (1.1)	-1 (1.6)	285 (1.6)	-12 (1.9)*
MATHEMATICS	**Proficiency in 1990**	**Difference from 1973**	**Proficiency in 1990**	**Difference from 1973**	**Proficiency in 1990**	**Difference from 1973**
Nation	230 (0.8)	11 (1.1)*	270 (0.9)	4 (1.4)	305 (0.9)	1 (1.4)
White	235 (0.8)	10 (1.3)*	276 (1.1)	3 (1.4)	310 (1.0)	-1 (1.5)
Black	208 (2.2)	18 (2.8)*	249 (2.3)	21 (3.0)*	289 (2.8)	19 (3.1)*
Hispanic	214 (2.1)	12 (3.2)*	255 (1.8)	16 (2.8)*	284 (2.9)	6 (3.6)
Male	229 (0.9)	11 (1.1)*	271 (1.2)	6 (1.8)*	306 (1.1)	-2 (1.6)
Female	230 (1.1)	10 (1.6)*	270 (0.9)	3 (1.4)	303 (1.1)	2 (1.6)
READING	**Proficiency in 1990**	**Difference from 1971**	**Proficiency in 1990**	**Difference from 1971**	**Proficiency in 1990**	**Difference from 1971**
Nation	209 (1.2)	2 (1.6)	257 (0.8)	2 (1.2)	290 (1.1)	5 (1.6)
White	217 (1.3)	3 (1.6)	262 (0.9)	1 (1.1)	297 (1.2)	5 (1.6)*
Black	182 (2.9)	12 (3.4)*	242 (2.2)	19 (2.5)*	267 (2.3)	29 (2.9)*
Hispanic	189 (2.3)	7 (3.2)	238 (2.3)	5 (3.8)	275 (3.6)	22 (5.1)*
Male	204 (1.7)	3 (2.0)	251 (1.1)	1 (1.5)	284 (1.6)	5 (2.0)
Female	215 (1.2)	1 (1.6)	263 (1.1)	2 (1.4)	297 (1.2)	5 (1.8)

NOTE: For Hispanic students, the science and reading differences are calculated between 1977 and 1990, and the reading differences are calculated between 1975 and 1990.

* Statistically significant difference at the .05 level. The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

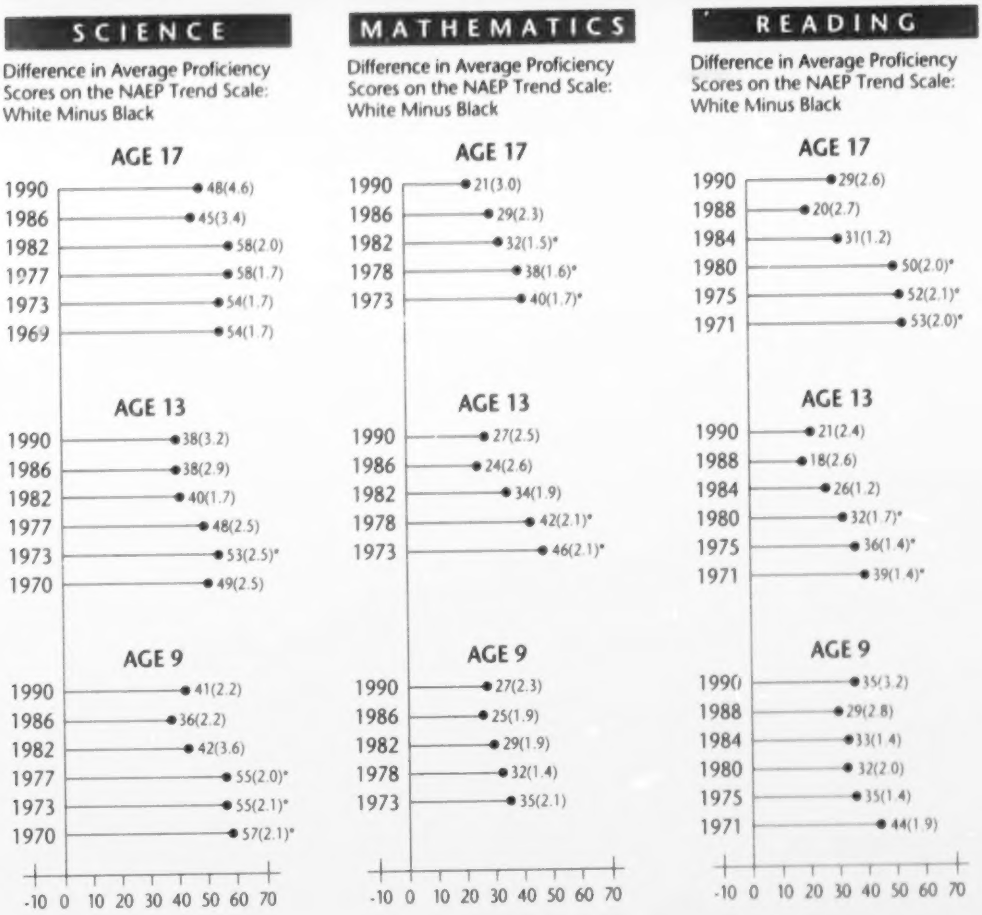
The 1990 results show that White students consistently had higher average achievement than their Black and Hispanic counterparts at all three ages in all three curriculum areas. The trends, however, do indicate considerable improvement by both minority groups. For example, between 1969-70 and 1990, science proficiency has remained stable for White 9- and 13-year-olds but decreased at age 17. In contrast, Black and Hispanic students showed gains at ages 9 and 13 (although the apparent increase for Black 13-year-olds was not statistically significant), and Black and Hispanic students maintained their initial levels of achievement at age 17.

In mathematics, the only significant progress by White students since 1973 was at age 9. In comparison, Black students showed significant improvement at all three ages, as did Hispanic students at ages 9 and 13. The reading results show the same pattern. Although the proficiency of White 17-year-olds has improved significantly since 1971, 9- and 13-year-olds were reading at about the same level in 1990 as nearly two decades ago. Black students, however, demonstrated significantly higher proficiency in 1990 at all three ages. Hispanic students also showed gains at age 17, yet their reading performance did not change significantly at the younger ages.

FIGURE 2 displays trends in the average performance differences between White and Black students, and FIGURE 3 displays similar information for White and Hispanic students. Despite progress in reducing these differences across the past two decades, the gaps remain large.

FIGURE 2

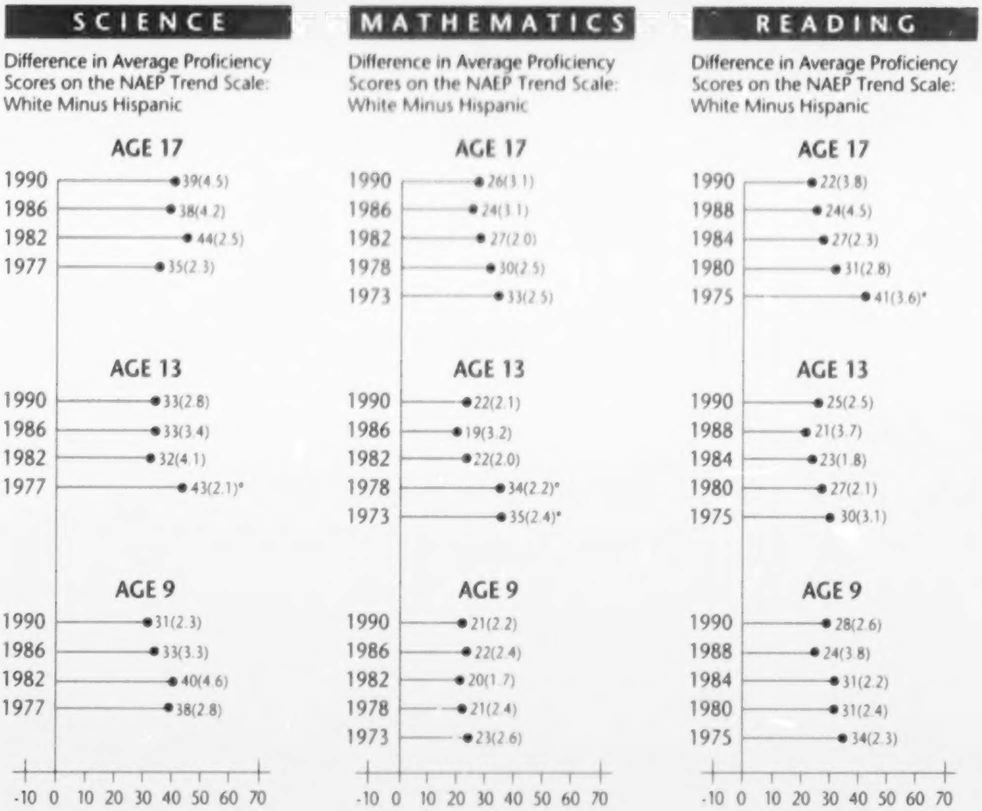
Trends in Differences in Average Proficiency of White and Black Students Across Subject Areas



* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons (each year compared to 1990). The standard errors of the estimated differences appear in parentheses.

FIGURE 3

Trends in Differences in Average Proficiency of White and Hispanic Students Across Subject Areas



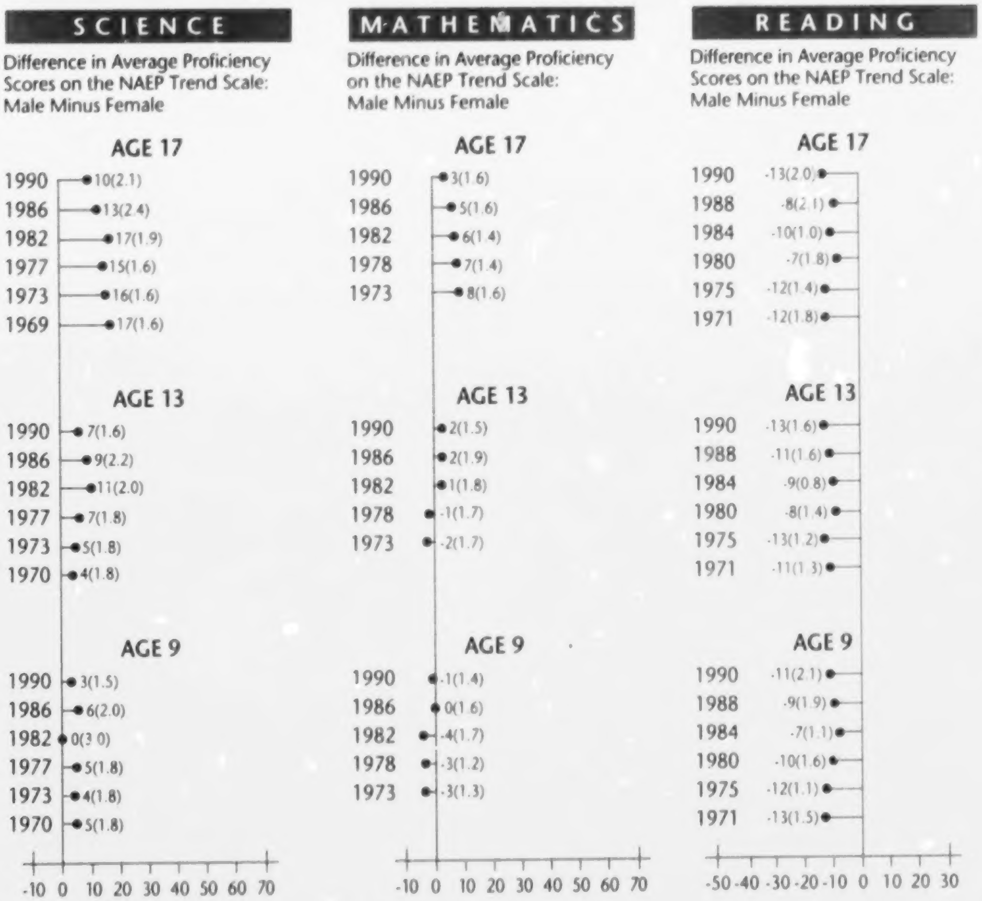
* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons (each year compared to 1990). The standard errors of the estimated differences appear in parentheses.

In science, progress has been made at ages 9 and 13 since the 1970s in reducing the differences in performance between White students and their Black counterparts. Yet the gaps remained essentially the same from 1982 to 1990. Progress also has been made in diminishing disparities between White students and Black students in mathematics achievement since 1973, although the apparent reduction at age 9 is not statistically significant. The gap has also narrowed between Hispanic 13-year-olds and their White counterparts in both science and mathematics. For reading, despite substantial progress toward closing the gaps for Black 13-year-olds and both Black and Hispanic 17-year-olds since the 1970s, this progress has stalled in recent assessments.

Trends in the gaps in gender performance are displayed in FIGURE 4. For science and mathematics, the data show consistency across the assessments. At age 9 in science and at ages 9 and 13 in mathematics, males and females have shown similar performance, while a modest, but statistically significant, difference favoring males exists in science at age 13. Discrepancies in performance have been more pronounced in both subjects at age 17, but have narrowed somewhat across the assessments. Males, however, still outperformed females, particularly in science.

FIGURE 4

Trends in Differences in Average Proficiency of Male and Female Students Across Subject Areas



* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons (each year compared to 1990). The standard errors of the estimated differences appear in parentheses.

The reading assessments show that the gender advantage in performance favors females at all three ages. As a result of the consistency of performance for both males and females across the reading assessments, these differences were essentially the same in 1990 as they were in 1971.

Trends in average writing achievement by race/ethnicity and gender are presented in TABLE 6. Between 1984 and 1990, the difference between Black students' writing achievement and that of their White counterparts remained essentially the same at all three grades. For Hispanic students in relation to their White classmates, the difference remained the same at grade 4, but tended to narrow at grades 8 and 11, although the apparent decreases were not statistically significant. The gender gap in writing favoring females showed nonstatistically significant increases at grades 4 and 8, but remained constant at grade 11.

In summary, considerable progress has been made across the NAEP assessments in closing some of the performance gaps between White students and their Black and Hispanic counterparts. However, with few exceptions, that progress appears to have stalled

TABLE 6

Average Achievement in Writing by Race/Ethnicity and Gender, 1984 to 1990

	GRADE 4		GRADE 8		GRADE 11	
	1984	**1990**	**1984**	**1990**	**1984**	**1990**
Nation	179 (2.2)	183 (1.5)	206 (1.4)	198 (1.3)	212 (1.7)	212 (1.3)
White	186 (2.6)	191 (1.6)	210 (1.6)*	202 (1.5)	218 (2.2)	217 (1.5)
Black	154 (4.3)	155 (4.8)	190 (3.6)	182 (2.8)	195 (4.4)	194 (2.3)
Difference	32 (5.0)	36 (5.0)	20 (3.9)	20 (3.2)	23 (4.9)	23 (2.7)
Hispanic	163 (3.5)	168 (3.4)	191 (5.7)	189 (3.0)	188 (3.9)	198 (3.9)
Difference	23 (4.4)	23 (3.7)	19 (5.9)	13 (3.4)	30 (4.8)	19 (4.2)
Female	184 (2.6)*	193 (2.2)	214 (1.9)*	208 (1.5)	223 (2.0)	224 (1.4)
Male	176 (3.0)	174 (1.6)	199 (1.8)*	187 (1.6)	201 (2.7)	200 (2.0)
Difference	8 (4.0)	19 (2.7)	15 (2.6)	21 (2.2)	22 (3.4)	24 (3.1)

* Statistically significant difference from 1990 at the .05 level. The rows of numbers in bold type display differences in average writing achievement between White students and their Black and Hispanic counterparts, and between males and females. The writing results represent the average across prompts given at each grade displayed on a 0 to 400 metric. The standard errors of the estimates appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

in the 1980s for both Black and Hispanic students in science, mathematics, and reading, and substantial differences remain. In writing, the differences in achievement between White and Black students remained constant across the 1980s, but narrowed somewhat between White and Hispanic students at ages 13 and 17. The modest gender gap favoring males in science and mathematics has existed primarily at age 17, where there was a slight reduction by 1990. In contrast, the gender gap favoring females in reading and writing at all three ages has not diminished across assessments.

TRENDS IN SCHOOL AND HOME CONTEXTS FOR LEARNING

The results for background questions about students' experiences and instructional settings revealed some slight progress toward implementing recommendations for school reform. For example, much emphasis has been placed on increasing high-school enrollments in mathematics and science courses, and this has occurred to some extent. However, few 17-year-olds have taken advanced courses.

There are also several signs that classroom and home environments may be changing toward providing more support for learning. Younger students have participated in more science activities and older students reported doing more reading in their language arts classes. Older students also reported participating in more discussion and using computers more often in mathematics classes. They appeared to be doing more types of writing, their papers were slightly longer, and their teachers were providing more comments about the ideas expressed in their papers.

However, few changes were apparent across assessments in students' attitudes toward their learning experiences or in their perceptions of the value of particular disciplines. In 1990, reading and writing were infrequent activities and students reported less access to a variety of reading materials in their homes. Also, the amount of television viewing increased, while the amount of homework done stayed about the same. Further, very few of the learning activities recurring in reform recommendations appear to have been implemented on a widespread basis.

SCIENCE
1969-70 to 1990

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PART I

TRENDS IN SCIENCE ACHIEVEMENT FROM 1969-70 TO 1990

INTRODUCTION

The national education goals and the AMERICA 2000 plan for achieving world-class educational standards have focused the attention of the nation's educational community on strategies for improving student achievement, particularly in mathematics and science.[7] The fourth goal adopted by the President and the governors states: "By the Year 2000, U.S. students will be first in the world in mathematics and science achievement." To facilitate efforts to accomplish this goal, it is important for educators and policymakers to understand what today's students know and can do in science and what recent trends in science achievement reveal about the science education efforts of the past 20 years.

To monitor progress across time in the science achievement of American students, NAEP has conducted six national assessments of science performance involving nationally representative samples of 9-, 13-, and 17-year-olds attending school. The assessments occurred in the 1969-70, 1972-73, 1976-77, 1981-82, 1985-86, and 1989-90 school years, except that the first science assessment of 17-year-olds was conducted in the spring of the 1968-69 school year. For convenience, each of the assessments is referred to by the last half of the school year in which it occurred — 1969, 1970, 1973, 1977, 1982, 1986, and 1990.

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[7] *Educating America: State Strategies for Achieving the National Education Goals* (Washington, DC: National Governors' Association, 1991).

AMERICA 2000: An Education Strategy (Washington, DC: U.S. Department of Education, 1991).

NAEP has based its science assessments on a wide range of science content areas, including topics from the life sciences, physical sciences, and earth and space sciences. NAEP has also assessed students' ability to solve problems in scientific contexts, conduct and design experiments, interpret data and read tables and graphs, and understand the nature of science.

The NAEP results were analyzed using item response theory (IRT) scaling technology, which produces estimates of students' science proficiencies on a scale ranging from 0 to 500. The NAEP proficiency scale is useful for tracking trends in science achievement over time and for making comparisons among demographic subpopulations of students in a single assessment. (The Procedural Appendix contains more detailed explanations of the analysis procedures and definitions of student subpopulations.) Trends in average science proficiency across the six NAEP science assessments for the nation and for demographic subpopulations are described in Chapter 1.

To provide meaning for student performance on the science proficiency scale, NAEP has characterized what students know and can do at five different levels on the scale: Level 150 — Knows Everyday Science Facts, Level 200 — Understands Simple Scientific Principles, Level 250 — Applies General Scientific Information, Level 300 — Analyzes Scientific Procedures and Data, and Level 350 — Integrates Specialized Scientific Information. Trends in performance at each of these levels for the nation and for demographic subpopulations are provided in Chapter 2.

NAEP also asked students participating in the assessments to provide information on their demographic characteristics, instructional experiences in science classrooms, and attitudes toward science. The relationships observed between science proficiency and students' experiences and demographic characteristics can provide a stimulus for educators, scientists, and policymakers to discuss issues and concerns about science education and to initiate further inquiries about factors that promote effective science education. Trends in students' experiences in science and their attitudes toward science are presented in Chapter 3.

It is important to note that NAEP reports results for groups of students, and not for individual students. The measures of achievement discussed in this report are the average performance of groups of students on the NAEP science proficiency scale and the percentages of students in each group who reached each of the five levels of performance on this scale. Because the average proficiencies and the percentages are based on samples of students, they are subject to sampling and measurement error. In this report, each proficiency or percentage is presented with a standard error — an estimate of the sampling error and other error associated with the observed assessment results. Statistically significant differences between previous assessments and 1990 are denoted with an asterisk, and statistically significant differences between 1969-70 and subsequent assessments are denoted with a dagger.

CHAPTER ONE

TRENDS IN SCIENCE PROFICIENCY FOR THE NATION AND DEMOGRAPHIC SUBPOPULATIONS

NATIONAL TRENDS IN SCIENCE PROFICIENCY FROM 1969-70 TO 1990

This chapter presents trends in average science proficiency across six national assessments for 9- and 13-year-olds and for in-school 17-year-olds on a single scale ranging from 0 to 500. FIGURE 1.1 provides an overall picture of these national trends.[8] For 17-year-olds, the assessments span the 21-year period from 1969 to 1990, and for 9- and 13-year-olds, the 20-year period from 1970 to 1990. Results for the 1977, 1982, 1986, and 1990 assessments are based on recent analyses to provide scaled results for the data collected in those years, while results for the earlier assessments in 1969 (17-year-olds only), 1970 (9-and 13-year-olds), and 1973 (all age groups) are extrapolated from previous analyses of NAEP data. (Please refer to the Procedural Appendix for details on the scaling methodology and information about drawing inferences from the trend analyses.)

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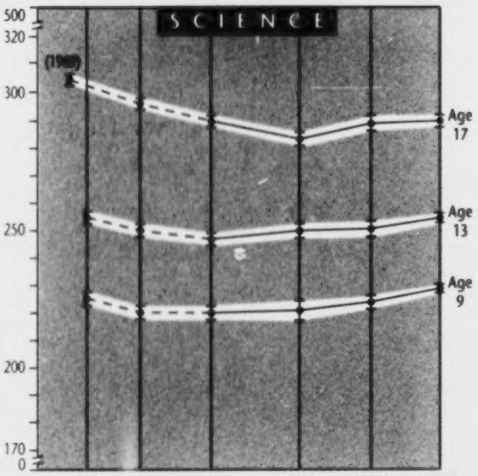
[8] The results of statistical tests between various assessment years using multiple-comparisons procedures are indicated on FIGURE 1.1. These tests were supported by tests for linear and quadratic trends. At age 9, both the linear and quadratic components of the trend line were statistically significant. At age 13, the quadratic term was statistically significant, but the linear term was not. At age 17, both the linear and quadratic terms of the trend over time were statistically significant.

The results of the six NAEP science assessments show that the average science proficiency of students in all three age groups declined significantly during the 1970s. However, proficiency at all three ages increased significantly from 1982 to 1990. The performance of both 9- and 13-year-olds in 1990 recovered from the declines during the 1970s to reach levels equal to those measured in the first assessment in 1970. However, despite the recent gains, the performance of 17-year-olds in 1990 remained significantly below the 1970 level.

FIGURE 1.1
Trends in Average Science Proficiency for the Nation, 1969–70 to 1990



	1970	1973	1977	1982	1986	1990
Age 17	305(1.0)*	296(1.0)*†	290(1.0)†	283(1.2)*†	289(1.4)†	290(1.1)†
Age 13	255(1.1)	250(1.1)*†	247(1.1)*†	250(1.3)*	251(1.4)	255(0.9)
Age 9	225(1.2)	220(1.2)*†	220(1.2)*†	221(1.8)*	224(1.2)*	229(0.8)

⌶ 95 percent confidence interval. [- - -] Extrapolated from previous NAEP analyses.

* Statistically significant difference from 1990 and † statistically significant difference from 1969–70, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 9 comparisons. The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

NINE-YEAR-OLDS. In the two decades covered by the NAEP science assessments, the proficiency of 9-year-olds declined significantly during the 1970s, and then showed significant improvement between 1982 and 1990. In 1990, their performance was significantly higher than the levels in each of the assessments from 1973 to 1986 and approximately equal to the level in the first national science assessment in 1970.

THIRTEEN-YEAR-OLDS. The average science proficiency of 13-year-olds followed a pattern similar to that of 9-year-olds, declining significantly during the 1970s, and then increasing significantly between 1982 and 1990. With this recent increase, the proficiency of 13-year-olds has returned to the level observed in 1970.

SEVENTEEN-YEAR-OLDS. The average science proficiency of 17-year-olds declined substantially between 1969 and 1982, but has improved significantly since then. However, the 1990 level of proficiency of 17-year-olds remained well below that measured in the first assessment in 1969.

The gains in science proficiency at all three ages during the 1980s have occurred concurrently with, and in the aftermath of, several national initiatives that focused the attention of educators and policymakers on the decreased science achievement of American students, the widespread lack of appropriate educational experiences in science classrooms (particularly in the elementary grades), and the need to provide our nation's students and workers with the knowledge and skills required to compete successfully in a world that is rapidly increasing in technological sophistication.[9] The 1990 results indicate that American students are now making advances toward improved achievement in science.

TRENDS IN SCIENCE PROFICIENCY FROM 1969-70 TO 1990 BY RACE/ETHNICITY

Trends in the average science proficiency of White, Black, and Hispanic students are displayed in FIGURE 1.2.[10] At ages 9 and 13, the average proficiency of White students declined from 1970 to 1977, while the average proficiency of 9- and 13-year-old Black students did not change significantly. (Data for 1970 and 1973 are not available for Hispanic students.) Between 1977 and 1990, the average proficiency of 9- and 13-year-olds increased significantly in all three racial/ethnic groups.

[9] *Educating Americans for the 21st Century: A Report to the American People and the National Science Board* (Washington, DC: National Science Board Commission on Precollege Education in Mathematics, Science, and Technology, 1983).

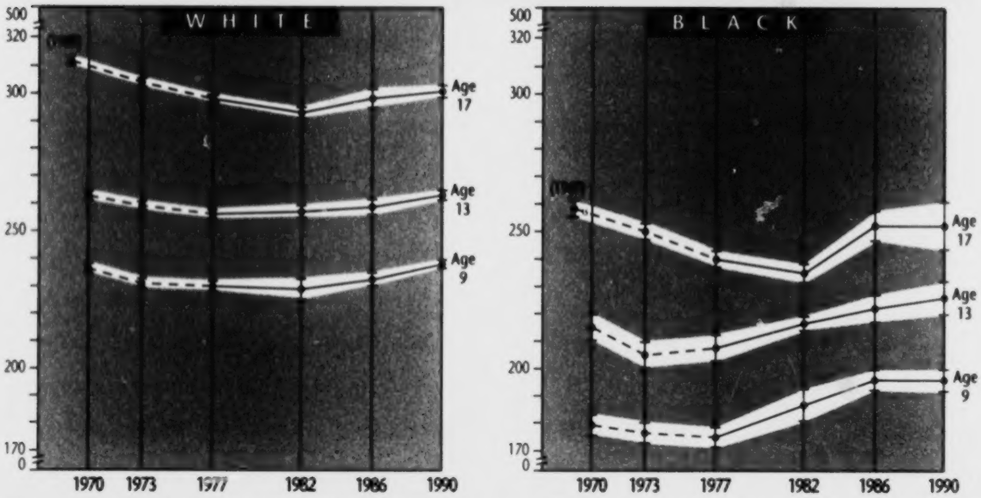
A Nation at Risk: The Imperative for Educational Reform (Washington, DC: National Commission on Excellence in Education, 1983).

Educating Scientists and Engineers: Grade School to Grad School (Washington, DC: Office of Technology Assessment, 1988).

[10] For Asian/Pacific Islander students and American Indian students, the sample sizes were insufficient to permit robust trend estimates.

FIGURE 1.2

Trends in Average Science Proficiency by Race/Ethnicity, 1969–70 to 1990

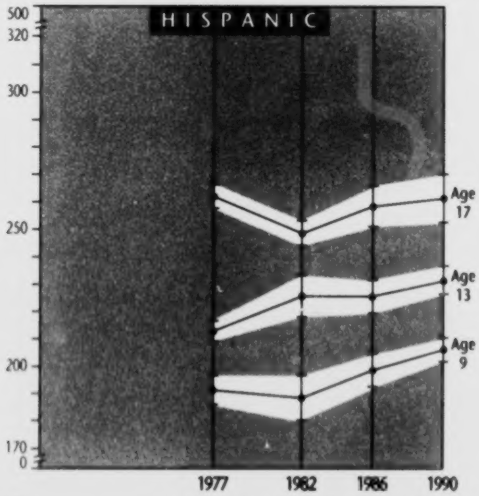


WHITE

	1970	1973	1977	1982	1986	1990
Age 17	**312(0.8)***	**304(0.8)†**	**298(0.7)†**	**293(1.0)*†**	**298(1.7)†**	**301(1.1)†**
	—	—	83(1.3)*	81(2.0)*	78(0.5)*†	73(0.5)†
Age 13	**263(0.8)**	**259(0.8)*†**	**256(0.8)*†**	**257(1.1)*†**	**259(1.4)***	**264(0.9)**
	—	—	80(1.6)*	79(2.1)	77(1.0)	73(0.7)†
Age 9	**236(0.9)**	**231(0.9)*†**	**230(0.9)*†**	**229(1.9)*†**	**232(1.2)***	**238(0.8)**
	—	—	80(1.6)	79(2.6)	77(1.1)	75(1.1)

BLACK

	1970	1973	1977	1982	1986	1990
Age 17	**258(1.5)**	**250(1.5)†**	**240(1.5)*†**	**235(1.7)*†**	**253(2.9)**	**253(4.5)**
	—	—	12(1.1)*	13(1.4)	14(0.3)*	16(0.3)†
Age 13	**215(2.4)**	**205(2.4)***	**208(2.4)***	**217(1.3)**	**222(2.5)**	**226(3.1)**
	—	—	13(1.2)*	14(1.9)	14(0.9)	16(0.3)†
Age 9	**179(1.9)***	**177(1.9)***	**175(1.8)***	**187(3.0)**	**196(1.9)†**	**196(2.0)†**
	—	—	14(1.4)	14(2.1)	15(0.5)	16(0.7)



HISPANIC

	1977	1982	1986	1990
Age 17	**262(2.2)**	**249(2.3)*†**	**259(3.8)**	**262(4.4)**
	4(0.9)	5(1.1)	6(0.3)	7(0.4)
Age 13	**213(1.9)***	**226(3.9)†**	**226(3.1)†**	**232(2.6)†**
	5(1.1)	5(1.0)	7(1.1)	7(0.5)
Age 9	**192(2.7)***	**189(4.2)***	**199(3.1)**	**206(2.2)†**
	5(0.9)	5(1.3)	6(1.1)	6(0.6)

Note: Average proficiencies are in **bold face** type. For each age, the second row of data lists the percentages of students in the total population from each subgroup. Unavailable data are shown by dashes (—).

Ī 95 percent confidence interval. [- - -] Extrapolated from previous NAEP analyses.

* Statistically significant difference from 1990 and † statistically significant difference from 1969–70 (for proficiencies for White and Black students) or 1977 (for proficiencies for Hispanic students and for all percentages), as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages do not total 100 percent because Asian/Pacific Islander and American Indian student data were analyzed separately. For Asian/Pacific Islander students and American Indian students, the sample sizes were insufficient to permit robust trend estimates.

Among 17-year-olds, there was a significant decline in achievement from 1969 to 1982 for White and Black students and a similar decline from 1977 to 1982 for Hispanic students. The performance of 17-year-olds in all three racial/ethnic groups increased significantly from 1982 to 1990, but the differences in achievement between 1986 and 1990 were not statistically significant for any of the three groups.

Due to the gains achieved since 1977, the 1990 proficiency of Black students at age 9 was significantly above the level attained in the 1970 assessment. At ages 13 and 17, the 1990 proficiency of Black students was not significantly different from the level in 1969-70. The proficiency gap between Black and White 9- and 13-year-olds has decreased significantly since the early 1970s; however, this narrowing of the gap did not continue between 1982 and 1990, and the proficiency gap between Black and White 17-year-olds has not narrowed significantly during the past two decades.[11] These latter results are of serious concern, because at all three ages the average proficiency of Black students remains significantly below that of White students.

The average science proficiency of 9- and 13-year-old Hispanic students in 1990 was significantly greater than the proficiency of same-aged counterparts in 1977, while that of 17-year-olds was virtually the same as in 1977. The proficiency gap between Hispanic and White students decreased between 1977 and 1990 at age 13, but an apparent decrease at age 9 was not statistically significant. No narrowing of the gap occurred at age 17 during the same period, and the average proficiency of Hispanic students at all three ages remained significantly below that of their White counterparts.

TRENDS IN SCIENCE PROFICIENCY FROM 1969-70 TO 1990 BY GENDER

Trends in average science proficiency for 9-, 13-, and 17-year-old males and females are provided in FIGURE 1.3. At ages 9 and 13, the average proficiency of both males and females declined significantly from 1970 to 1977 and then increased significantly from 1977 to 1990, returning to levels approximately equal to the 1970 levels. At age 17, performance trends for the first four assessments were comparable for males and females, with both groups showing large declines from 1969 to 1982. Between 1982 and 1990, the proficiency of females increased significantly, while that of males did not. However, for both genders average science proficiency at age 17 in 1990 was significantly below the 1969 levels.

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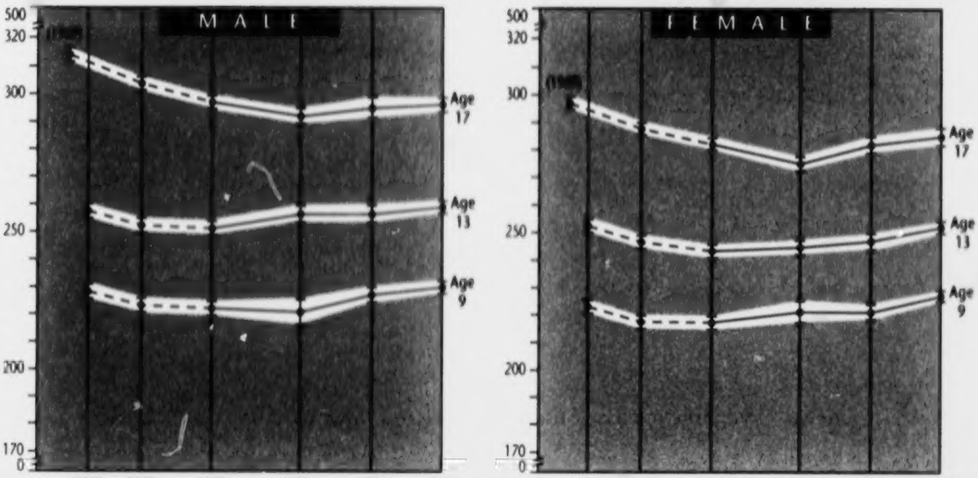
[11] Trends in differences in average proficiency of White and Black students and White and Hispanic students are displayed in FIGURE 2 and FIGURE 3 of the Executive Summary.

In each of the assessments, there were small or no gender differences in performance at age 9. At ages 13 and 17, the average science proficiency of females in 1990 was significantly lower than that of males, continuing a trend that has existed at age 13 since 1977 and at age 17 since 1969. Additionally, the performance gap between the genders at age 17 has not narrowed significantly during the last two decades. However, the fact that the significant improvement by 17-year-old females during the 1980s was not matched by their male counterparts led to an apparent (but nonsignificant) decrease in the gap between 1982 and 1990. Seventeen-year-old females' improved performance may signal that the variety of programs and efforts to interest more women in science are beginning to have an effect.[12]

FIGURE 1.3

Trends in Average Science Proficiency by Gender, 1969–70 to 1990



	1970	1973	1977	1982	1986	1990	1970	1973	1977	1982	1986	1990
Age 17	**314**(1.2)*	**304**(1.2)*†	**297**(1.2)†	**292**(1.4)†	**295**(1.9)†	**296**(1.3)†	**297**(1.1)*	**288**(1.1)†	**282**(1.1)†	**275**(1.3)*†	**282**(1.5)†	**285**(1.6)†
	—	—	50(0.7)	48(0.7)	49(1.2)	49(0.9)	—	—	51(0.7)	52(0.7)	51(1.2)	51(0.9)
Age 13	**257**(1.3)	**252**(1.3)*	**251**(1.3)*†	**256**(1.5)	**256**(1.6)	**259**(1.1)	**253**(1.2)	**247**(1.2)†	**244**(1.2)*†	**245**(1.3)*†	**247**(1.5)†	**252**(1.1)
	—	—	50(0.3)	49(0.7)	50(0.9)	50(0.6)	—	—	50(0.3)	52(0.7)	50(0.9)	50(0.6)
Age 9	**228**(1.3)	**223**(1.3)*	**222**(1.3)*†	**221**(2.3)*	**227**(1.4)	**230**(1.1)	**223**(1.2)	**218**(1.2)*	**218**(1.2)*†	**221**(2.0)*	**221**(1.4)*	**227**(1.0)
	—	—	51(0.4)	51(1.5)	50(0.6)	49(0.6)	—	—	49(0.4)	50(1.5)	50(0.6)	51(0.6)

Note: Average proficiencies are in **bold face** type. For each age, the second row of data lists the percentages of students in the total population from each subgroup. Unavailable data are shown by dashes (—).

Ī 95 percent confidence interval. [- - -] Extrapolated from previous NAEP analyses.

* Statistically significant difference from 1990 and † statistically significant difference from 1969–70 (for proficiencies) or 1977 (for percentages), as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons. The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

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[12] *Changing America: The New Face of Science and Engineering* (Washington, DC: Task Force on Women, Minorities, and the Handicapped in Science and Technology, 1989).

TRENDS IN SCIENCE PROFICIENCY FROM 1969-70 TO 1990 BY REGION

Regional trends for the six NAEP science assessments are presented in FIGURE 1.4. In the Northeast, the average proficiency of 9- and 13-year-olds has not changed significantly since 1970. The proficiency of in-school 17-year-olds declined from 1969 to 1982, and remains well below the level attained in 1969.

In 1990, 9- and 13-year-olds in the Southeast showed significantly improved performance compared to the assessments conducted in the 1970s, with significant gains between 1977 and 1990. At age 17, proficiency decreased between 1969 and 1977, but performance in 1990 was similar to that registered 21 years ago.

Although the average science proficiency of 9-year-olds in the Central region increased significantly between 1977 and 1990, the proficiency of both 9- and 13-year-olds in 1990 was similar to the level achieved in 1970. At age 17, proficiency declined from 1969 to 1982, but due to an apparent (but nonsignificant) increase between 1982 and 1990, appears to be recovering to the 1969 level.

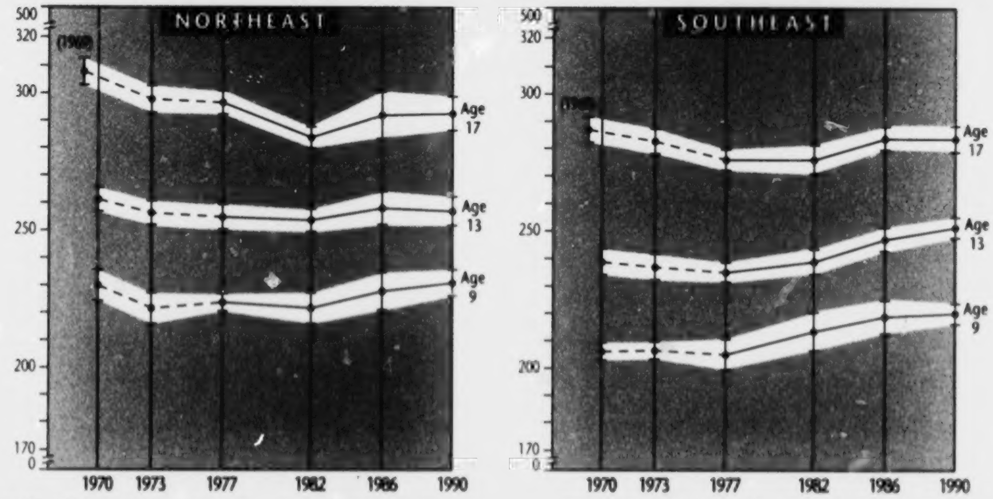
After declining from 1970 to 1977, the science proficiency of 13-year-olds in the West increased between 1977 and 1990 to levels that did not differ significantly from those in 1970. The pattern was similar for 9-year-olds, although their apparent declines during the 1970s were not statistically significant. The performance of 17-year-olds in the West declined significantly during the 1970s and in 1990 remained significantly below the 1969 level.

TRENDS IN SCIENCE PROFICIENCY FROM 1977 TO 1990 BY TYPE OF COMMUNITY

Trends in average science proficiency for students attending school in four different types of communities are presented in TABLE 1.1. Results are not available for assessments conducted prior to 1977. Nine-year-olds in disadvantaged urban schools showed significant progress between 1977 and 1990, as did those attending schools in community types classified as "other." The gain for 9-year-olds in extreme rural schools between 1977 and 1990 was not statistically significant, and average proficiency for 9-year-olds in advantaged urban schools was virtually constant across assessments. The pattern was similar for 13-year-olds, except that the gain in proficiency by students in disadvantaged urban schools was not statistically significant. Little or no change in the proficiency of 17-year-olds occurred from 1977 to 1990 in any of the community types. In both 1977 and 1990, and for all three age groups, students in advantaged urban communities had significantly higher proficiency than did students in disadvantaged urban communities — although at age 9, the gap has narrowed significantly since 1977 (by 29 scale points).

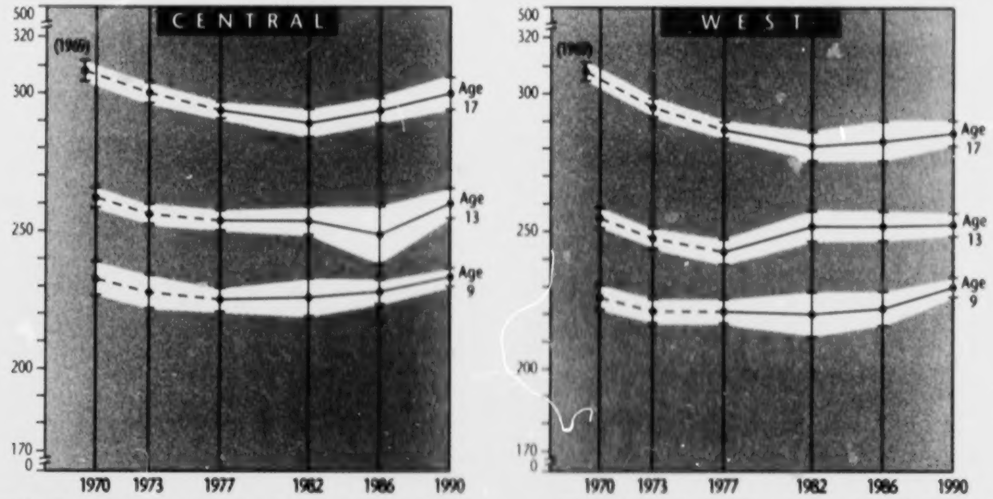
FIGURE 1.4

Trends in Average Science Proficiency by Region, 1969–70 to 1990



NORTHEAST	1970	1973	1977	1982	1986	1990
Age 17	**308(2.5)***	**298(2.5)**	**296(2.2)†**	**284(2.0)†**	**292(4.3)†**	**293(3.2)†**
	—	—	24(1.7)	25(3.0)	24(0.8)	22(1.0)
Age 13	**261(2.2)**	**256(2.2)**	**255(2.3)**	**254(2.1)**	**258(3.1)**	**257(2.7)**
	—	—	26(1.5)	24(2.9)	22(1.6)	24(1.0)
Age 9	**230(2.9)**	**222(2.9)**	**224(1.6)**	**222(2.9)**	**228(3.5)**	**231(2.4)**
	—	—	25(1.5)	19(2.3)	21(1.1)	23(0.9)

SOUTHEAST	1970	1973	1977	1982	1986	1990
Age 17	**287(2.3)**	**283(2.3)**	**276(1.9)†**	**276(2.7)†**	**284(2.0)**	**284(2.4)**
	—	—	18(1.0)*	21(2.4)	23(2.3)	24(0.9)†
Age 13	**239(2.4)***	**237(2.4)***	**235(1.8)***	**239(2.3)***	**247([illegible])**	**251(1.9)†**
	—	—	21(1.1)	22(2.3)	[illegible](5.8)	23(0.8)
Age 9	**206(1.6)***	**207(1.6)***	**205(2.9)***	**214(3.6)**	**[illegible](3.1)†**	**220(1.9)†**
	—	—	20(1.2)	23(2.7)	23(4.7)	24(0.9)



CENTRAL	1970	1973	1977	1982	1986	1990
Age 17	**308(1.9)**	**300(1.9)**	**294(1.5)†**	**289(2.6)†**	**294(2.3)†**	**300(3.0)**
	—	—	33(1.6)*	30(3.9)	28(2.2)	26(0.9)†
Age 13	**262(1.8)**	**256(1.8)**	**254(1.8)†**	**254(2.6)**	**249(5.3)**	**260(2.8)**
	—	—	27(1.9)	28(3.9)	25(5.0)	24(0.7)
Age 9	**233(3.0)**	**228(3.0)**	**225(2.2)***	**226(3.5)**	**228(2.2)**	**234(1.7)**
	—	—	30(1.9)	30(4.3)	29(4.0)	24(0.6)

WEST	1970	1973	1977	1982	1986	1990
Age 17	**308(1.7)***	**295(1.7)*†**	**287(1.5)†**	**281(2.7)†**	**283(3.8)†**	**286(2.3)†**
	—	—	24(1.9)	25(2.6)	26(0.9)	28(0.9)
Age 13	**255(1.8)**	**248(1.8)**	**243(2.3)*†**	**252(2.8)**	**252(2.7)**	**253(2.1)**
	—	—	26(2.1)	26(2.5)	28(1.5)	29(0.9)
Age 9	**226(2.2)**	**221(2.2)**	**221(2.2)***	**220(4.1)**	**222(3.2)**	**230(1.8)**
	—	—	25(2.0)	28(2.7)	28(1.6)	28(0.8)

Note: Average proficiencies are in **bold face** type. For each age, the second row of data lists the percentages of students in the total population from each subgroup. Unavailable data are shown by dashes (—).

⌶ 95 percent confidence interval. [- - -] Extrapolated from previous NAEP analyses.

* Statistically significant difference from 1990 and † statistically significant difference from 1969–70 (for proficiencies) or 1977 (for percentages), as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons. The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

TABLE 1.1

Trends in Average Science Proficiency by Type of Community, 1977 to 1990

		AGE 9		AGE 13		AGE 17	
Type of Community	**Year**	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**
Advantaged Urban	1990	12 (2.2)	241 (1.6)	10 (1.9)	268 (1.8)	11 (1.7)	305 (4.3)
	1986	17 (3.1)	243 (2.4)	12 (3.5)	267 (3.8)	13 (2.5)	302 (7.1)
	1982	11 (2.1)	243 (4.3)	9 (3.1)	276 (2.1)*†	10 (1.9)	305 (2.1)
	1977	10 (2.0)	242 (2.2)	13 (2.7)	268 (1.3)	12 (2.5)	304 (3.2)
Disadvantaged Urban	1990	9 (2.5)	209 (5.9)†	11 (2.0)	227 (4.6)	9 (2.0)	254 (7.2)
	1986	6 (1.6)	192 (3.8)	9 (4.3)	223 (3.9)	6 (1.1)	241 (4.0)†
	1982	6 (1.8)	192 (5.7)	8 (1.6)	222 (3.5)	8 (1.8)	250 (5.5)
	1977	8 (1.6)	181 (3.4)*	7 (1.3)	216 (2.8)	8 (1.5)	256 (3.1)
Extreme Rural	1990	8 (1.6)	233 (4.3)	10 (2.4)	249 (4.0)	12 (1.7)	294 (3.5)
	1986	5 (2.2)	224 (4.4)	6 (3.5)	258 (3.0)†	3 (1.2)	296 (6.7)
	1982	12 (4.6)	212 (5.3)*	11 (2.5)	245 (3.7)	8 (1.7)	283 (3.3)
	1977	9 (2.0)	225 (3.2)	10 (2.3)	245 (3.2)	7 (1.4)	289 (2.6)
Other	1990	72 (4.0)	229 (1.2)†	70 (3.4)	259 (1.3)†	69 (3.1)	293 (1.4)
	1986	73 (4.1)	223 (1.7)*	74 (6.3)	252 (1.2)*†	78 (3.5)	290 (1.6)
	1982	71 (4.8)	222 (2.1)*	73 (4.2)	251 (1.0)*	74 (3.0)	284 (1.5)*†
	1977	74 (3.3)	220 (1.4)*	71 (3.9)	247 (1.1)*	73 (3.2)	291 (1.0)

* Statistically significant difference from 1990 and † statistically significant difference from 1977, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 5 comparisons. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

TRENDS IN SCIENCE PROFICIENCY FROM 1977 TO 1990 BY PARENTS' HIGHEST LEVEL OF EDUCATION Trends in science proficiency for students of all three ages, grouped by their parents' highest level of education, are presented in TABLE 1.2. At ages 9 and 13, students whose parents had not graduated from high school showed significant gains between 1977 and 1990. Seventeen-year-old students whose parents had graduated from high school, but had no further education, showed declines in proficiency during the same period. Except for these changes, however, proficiency has remained relatively stable over time.

At all three ages, and in each assessment from 1977 to 1990, with few exceptions, students whose parents had graduated from college or had some education beyond high school achieved significantly higher proficiency than did students whose parents had no education beyond high school. Also, in each assessment and for each age, students whose

TABLE 1.2

Trends in Average Science Proficiency by Parents' Highest Level of Education, 1977 to 1990

		AGE 9		AGE 13		AGE 17	
Level of Education	**Year**	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**
Less than High School	1990	5 (0.4)†	210 (2.7)†	8 (0.5)†	233 (2.1)†	8 (0.6)†	261 (2.8)
	1986	4 (0.4)	204 (2.9)	8 (1.0)†	229 (2.7)	8 (0.4)†	258 (3.1)
	1982	7 (0.9)	198 (6.0)	10 (0.6)†	225 (1.9)	13 (0.7)*	259 (2.4)
	1977	9 (0.4)*	199 (2.2)*	13 (0.7)*	224 (1.3)*	15 (0.9)*	265 (1.3)
Graduated High School	1990	16 (0.7)†	226 (1.7)	27 (0.8)†	247 (1.3)	26 (1.1)†	276 (1.4)†
	1986	16 (0.7)†	220 (1.5)*	31 (1.2)	245 (1.4)	28 (1.1)†	277 (2.0)†
	1982	15 (1.1)†	218 (3.3)	26 (1.1)†	243 (1.3)	29 (0.9)†	275 (1.6)†
	1977	27 (0.5)*	223 (1.4)	33 (0.6)*	245 (1.1)	33 (0.6)*	284 (0.8)*
Some Education After High School	1990	7 (0.4)	238 (2.1)	17 (0.6)	263 (1.2)	24 (0.9)†	297 (1.6)
	1986	7 (0.6)	236 (2.6)	15 (0.6)	258 (1.4)	24 (1.0)†	295 (2.5)
	1982	8 (0.6)	229 (3.2)	17 (0.6)	259 (1.5)	22 (0.6)†	290 (1.7)*†
	1977	7 (0.3)	237 (1.5)	15 (0.5)	260 (1.3)	17 (0.4)*	296 (1.1)
Graduated College	1990	40 (1.1)†	236 (1.3)	41 (1.2)†	268 (1.1)	39 (1.3)†	306 (1.7)
	1986	38 (1.1)†	235 (1.4)	37 (2.2)†	264 (1.9)	37 (1.2)†	304 (2.1)
	1982	42 (2.3)†	231 (2.3)	37 (1.5)†	264 (1.5)	32 (1.4)*	300 (1.7)†
	1977	23 (0.7)*	232 (1.4)	27 (1.0)*	266 (1.0)	30 (1.2)*	309 (1.0)

* Statistically significant difference from 1990 and † statistically significant difference from 1977, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 5 comparisons. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students do not total 100 percent because about one-third of the students at age 9 and smaller percentages at ages 13 and 17 reported that they did not know the education level of either parent.

parents had graduated from high school, but had no further education, had a significantly higher science proficiency than did students whose parents had not graduated from high school.

TRENDS IN SCIENCE PROFICIENCY FROM 1977 TO 1990 BY TYPE OF SCHOOL Trends in average science proficiency for students of all three ages in public and private schools (Catholic and other private schools) are presented in TABLE 1.3. Nine- and 13-year-old private-school students had significantly higher proficiency than did their counterparts in public schools in both 1977 and 1990. However, 9- and 13-year-olds in public schools achieved a significant increase in proficiency between 1977 and 1990 that was not matched by their private-school counterparts. Seventeen-year-old students in private schools performed significantly better than did those in public schools in both 1977 and 1990, but in both types of schools their proficiency remained virtually unchanged from 1977 to 1990.

TABLE 1.3

Trends in Average Science Proficiency by Type of School, 1977 to 1990

Type of School	Year	AGE 9		AGE 13		AGE 17	
		Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Public	1990	89 (2.1)	228 (0.9)†	90 (1.4)	254 (1.1)†	93 (1.8)	289 (1.1)
	1986	84 (2.7)	223 (1.4)*	96 (1.8)*	251 (1.4)	96 (1.4)	287 (1.6)
	1982	90 (2.3)	220 (2.0)*	90 (1.7)	249 (1.4)*	90 (2.0)	282 (1.1)*†
	1977	89 (1.2)	218 (1.4)*	90 (1.4)	245 (1.2)*	94 (1.8)	288 (1.0)
Private	1990	11 (2.1)	237 (2.4)	10 (1.4)	269 (1.8)	7 (1.8)	308 (6.6)
	1986	16 (2.7)	233 (2.9)	4 (1.8)	263 (6.4)	4 (1.4)	321(10.1)
	1982	10 (2.3)	232 (3.2)	11 (1.7)	264 (3.2)	10 (2.0)	292 (2.9)†
	1977	11 (1.2)	235 (2.2)	10 (1.4)	268 (2.1)	6 (1.8)	308 (2.4)

* Statistically significant difference from 1990 and † statistically significant difference from 1977, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 5 comparisons. (No significance test is reported when the percentage of students is either > 9[illegible] or < 5.0.) The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

TRENDS IN SCIENCE PROFICIENCY FROM 1977 TO 1990 BY QUARTILES TABLE 1.4 shows trends in average science proficiency for students at each age who were in the upper quartile, middle two quartiles, and the lower quartile of student performance in each of the assessments. From 1977 to 1990, significant gains in proficiency were achieved by 9- and 13-year-olds in the upper, middle, and lower quartiles, indicating that the gains achieved by these age groups on a national level were a result of gains by students at all levels of proficiency.

Significant gains were achieved by 17-year-olds in the upper quartile between 1977 and 1990, but a significant decrease in proficiency occurred for students in the lower quartile. Thus, while average science proficiency at age 17 remained unchanged between 1977 and 1990 for the nation as a whole, the most proficient students are now performing better, and the least proficient students are performing worse than in 1977. The improvement by the top students is consistent with our country's need to compete in a global

TABLE 1.4

Trends in Average Science Proficiency by Quartiles, 1977 to 1990

Quartile	Year	AVERAGE PROFICIENCY Age 9	Age 13	Age 17
Upper Quartile	1990	271 (0.8)†	297 (0.7)†	344 (0.7)†
	1986	269 (1.2)	292 (1.1)*	340 (1.1)*†
	1982	268 (1.8)	291 (0.9)*	329 (1.0)*†
	1977	266 (0.9)*	291 (0.5)*	334 (0.9)*
Middle Two Quartiles	1990	231 (0.5)†	256 (0.6)†	292 (0.7)
	1986	226 (0.6)*†	252 (0.7)*†	290 (0.7)
	1982	222 (1.1)*	251 (0.6)*	286 (0.7)*†
	1977	222 (0.5)*	249 (0.6)*	291 (0.5)
Lower Quartile	1990	182 (0.9)†	211 (1.2)†	234 (1.2)†
	1986	177 (1.0)*†	209 (0.9)†	235 (1.3)†
	1982	171 (2.0)*	208 (0.8)†	232 (1.3)†
	1977	170 (1.1)*	201 (0.8)*	242 (0.8)*

* Statistically significant difference from 1990 and † statistically significant difference from 1977, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 5 comparisons. The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

economy, but the decreases for the least proficient students run contrary to education reform recommendations that science be for all students.[11]

SUMMARY The trend results from the NAEP science assessments show that the average science proficiency of 9- and 13-year-old students declined during the 1970s, then increased significantly between 1982 and 1990 to reach a level equal to that of the first assessment two decades earlier. The proficiency of 17-year-olds declined between 1969 and 1982 — but, despite a large gain between 1982 and 1990, the proficiency of 17-year-olds in 1990 remained substantially below the 1969 level. Further, trends since 1977 show that while the top 25 percent of 17-year-olds in 1990 were more proficient than their counterparts 13 years ago, the bottom 25 percent were less proficient. This latter finding is in direct contradiction with reform recommendations stressing the importance of science education for all students.

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[11] *Educating Americans for the 21st Century: A Report to the American People and the National Science Board* (Washington, DC: National Science Board Commission on Precollege Education in Mathematics, Science, and Technology, 1983).

Science for All Americans: A Project 2061 Report on Literacy Goals in Science, Mathematics, and Technology (Washington, DC: American Association for the Advancement of Science, 1989).

In 1990, 9-year-old Black students performed at levels above those observed in 1970, and the performance gap between Black and White students at ages 9 and 13 has decreased since the early 1970s. However, on average, the proficiency of Black students remained below that of White students in the same age groups. In addition, a significant gap in proficiency existed between White and Hispanic students in 1990 at all three ages, despite significant increases in the science achievement of 9- and 13-year-old Hispanic students since 1977. Additionally, the progress that had been made during the 1970s at ages 9 and 13 in reducing the science proficiency gaps between White students and their Black counterparts did not continue between 1982 and 1990.

At ages 9 and 13, the science proficiency of both male and female students in 1990 was nearly the same as in 1970. At age 17, both males and females had significantly lower average proficiency in 1990 than in 1969. However, the proficiency of 17-year-old females increased significantly between 1982 and 1990, while that of males did not. Efforts to provide more encouragement to females to focus on science during the high-school years may be beginning to have an impact.

On a regional level, increases in proficiency at ages 9 and 13 occurred in the Southeast between 1970 and 1990. In the other three regions, the proficiency of 9- and 13-year-olds in 1990 was not different from that in 1970. At age 17, the proficiency of students in the Northeast and West was lower in 1990 than in 1969, while in the Southeast and Central regions proficiency remained relatively stable over the past two decades.

Nine-year-olds attending schools in disadvantaged urban communities have made substantial progress since 1977 in closing the gap with their counterparts in advantaged urban schools. Nine- and 13-year-olds in public schools also showed significant improvement during the same period.

Overall, the trends since 1982 are encouraging because they show an improvement in science achievement nationwide. However, some results from the 1990 science assessment provide cause for concern — particularly the evidence that the upward trend in achievement of 9- and 17-year-old Black students appears to have stalled somewhat. Even though science achievement is increasing on a national level, gaps between racial/ethnic subgroups and between 13- and 17-year-old male and female students continue to exist. Finally, science proficiency at all three ages was no higher in 1990 than it was 20 years ago, and at age 17, it was lower.

CHAPTER TWO

TRENDS IN LEVELS OF SCIENCE PROFICIENCY FOR THE NATION AND DEMOGRAPHIC SUBPOPULATIONS

NATIONAL TRENDS IN LEVELS OF SCIENCE PROFICIENCY FROM 1977 TO 1990

This chapter presents information about trends in the percentages of students attaining various levels of science proficiency across the four science assessments conducted by NAEP from 1977 to 1990. In order to describe students' knowledge and skills in science, NAEP used the range of student performance in the assessment to describe five levels of proficiency — 150, 200, 250, 300, and 350. Each of these proficiency levels is described in FIGURE 2.1. The descriptions of the five levels were developed by a panel of science specialists who analyzed the types of items in the assessment that discriminated between adjacent performance levels — items that were likely to be answered correctly by students who performed at one of the five levels on the scale and much less likely to be answered correctly by students who performed at the next lower level. The members of the panel identified the types of knowledge and skills assessed by these items and used those skills as a basis for constructing the descriptions of the proficiency levels.

Levels on the proficiency scale can be characterized as the interaction between understanding scientific facts and concepts and the ability to "do" science, including the ability to synthesize information, to apply knowledge to new situations, and to infer relationships and draw conclusions. In general, students performed well on questions about basic scientific facts, particularly if the questions involved information likely to be encountered in everyday experience. However, students' performance decreased as they encountered questions that asked them to analyze, evaluate, apply, or otherwise deal with more complex or detailed information.

FIGURE 2.1

Levels of Science Proficiency

LEVEL 350 INTEGRATES SPECIALIZED SCIENTIFIC INFORMATION

Students at this level can infer relationships and draw conclusions using detailed scientific knowledge from the physical sciences, particularly chemistry. They also can apply basic principles of genetics and interpret the societal implications of research in this field.

LEVEL 300 ANALYZES SCIENTIFIC PROCEDURES AND DATA

Students at this level can evaluate the appropriateness of the design of an experiment. They have more detailed scientific knowledge, and the skill to apply their knowledge in interpreting information from text and graphs. These students also exhibit a growing understanding of principles from the physical sciences.

LEVEL 250 APPLIES GENERAL SCIENTIFIC INFORMATION

Students at this level can interpret data from simple tables and make inferences about the outcomes of experimental procedures. They exhibit knowledge and understanding of the life sciences, including a familiarity with some aspects of animal behavior and of ecological relationships. These students also demonstrate some knowledge of basic information from the physical sciences.

LEVEL 200 UNDERSTANDS SIMPLE SCIENTIFIC PRINCIPLES

Students at this level are developing some understanding of simple scientific principles, particularly in the life sciences. For example, they exhibit some rudimentary knowledge of the structure and function of plants and animals.

LEVEL 150 KNOWS EVERYDAY SCIENCE FACTS

Students at this level know some general scientific facts of the type that could be learned from everyday experiences. They can read simple graphs, match the distinguishing characteristics of animals, and predict the operation of familiar apparatus that work according to mechanical principles.

Trends in the percentages of 9-, 13-, and 17-year-olds at or above each level of proficiency in the NAEP science assessments from 1977 to 1990 are shown in TABLE 2.1. An examination of these data allows trends in average science proficiency to be interpreted in terms of students' abilities to understand and use scientific information and science-related skills.

In 1990, 97 percent of the 9-year-old students demonstrated some knowledge of general scientific facts by performing at or above Level 150. Approximately three-fourths of the 9-year-olds showed a grasp of some simple scientific principles (Level 200) in 1990, and nearly one-third demonstrated an ability to apply scientific information (Level 250). The

TABLE 2.1

Trends in Percentages of Students at or Above Five Science Proficiency Levels, 1977 to 1990

Proficiency Levels	Age	ASSESSMENT YEARS			
		1977	1982	1986	1990
Level 350					
Integrates Specialized Scientific Information	9	0 (0.0)	0 (0.1)	0 (0.1)	0 (0.0)
	13	1 (0.1)	0 (0.1)	0 (0.1)	0 (0.1)
	17	9 (0.4)	7 (0.4)*	8 (0.7)	9 (0.5)
Level 300					
Analyzes Scientific Procedures and Data	9	3 (0.3)	2 (0.7)	3 (0.5)	3 (0.3)
	13	11 (0.5)	10 (0.7)	9 (0.9)	11 (0.6)
	17	42 (0.9)	37 (0.9)*	41 (1.4)	43 (1.3)
Level 250					
Applies General Scientific Information	9	26 (0.7)*	24 (1.8)*	28 (1.4)	31 (0.8)
	13	49 (1.1) *	51 (1.6)*	53 (1.6)	57 (1.0)
	17	82 (0.7)	77 (1.0)*	81 (1.3)	81 (0.9)
Level 200					
Understands Simple Scientific Principles	9	68 (1.1)*	71 (1.9)*	72 (1.1)*	76 (0.9)
	13	86 (0.7)*	90 (0.8)	92 (1.0)	92 (0.7)
	17	97 (0.2)	96 (0.5)	97 (0.5)	97 (0.3)
Level 150					
Knows Everyday Science Facts	9	94 (0.6)	95 (0.7)	96 (0.3)	97 (0.3)
	13	99 (0.2)	100 (0.1)	100 (0.1)	100 (0.1)
	17	100 (0.0)	100 (0.1)	100 (0.1)	100 (0.2)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous science assessments and 1990. Thus, alpha equals .0167 for each comparison. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the percentage of students is either 0 or 100, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent, and percentages less than 0.5 percent were rounded to 0 percent.

percentage of 9-year-olds at or above Levels 200 and 250 was significantly higher than in 1977 or 1982. Perhaps understandably, because of the nature of the science curriculum in elementary schools, only 3 percent of the students in this age group could perform the skills typical of Level 300 in 1990, and virtually no students reached Level 350. The small percentages of 9-year-olds performing at these two most advanced levels have remained unchanged since 1977.

In each of the four science assessments from 1977 to 1990, virtually all 13-year-olds reached Level 150. In 1990, 92 percent of 13-year-olds reached Level 200 — a significant increase from 86 percent in 1977. More than half (57 percent) performed at or above Level 250 in 1990 — a significant increase from 49 percent in 1977. About one in ten 13-

year-olds reached Level 300 in 1990, but almost none attained Level 350. As at age 9, the small percentages of 13-year-olds reaching either of the two most advanced proficiency levels have remained unchanged since 1977.

In general, the percentages of 17-year-olds at or above each of the five proficiency levels have remained essentially unchanged from 1977 to 1990. In 1990, nearly all 17-year-olds demonstrated an understanding of simple scientific principles (Level 200). Approximately four-fifths (81 percent) performed at or above Level 250, and slightly more than two-fifths (43 percent) demonstrated the analytical, evaluative, and interpretive skills associated with Level 300. However, only 9 percent of the 17-year-olds demonstrated an ability to integrate specialized scientific information (Level 350), and these figures do not include their counterparts who have dropped out of high school.

LEVEL 150: KNOWS EVERYDAY SCIENCE FACTS. The results from 1977 and 1990 show that nearly every student at all three ages had some knowledge of general scientific facts and an ability to read simple graphs, the material typical of performance at Level 150.

LEVEL 200: UNDERSTANDS SIMPLE SCIENTIFIC PRINCIPLES. In 1990, three-fourths of the 9-year-olds and nearly all 13- and 17-year-olds had some understanding of simple scientific principles as well as basic knowledge about plants and animals. At both ages 9 and 13, the percentages of students performing at Level 200 have increased since 1977, while at age 17 the percentage has remained constant.

LEVEL 250: APPLIES GENERAL SCIENTIFIC INFORMATION. In 1990, 31 percent of 9-year-olds and 57 percent of 13-year-olds were able to perform tasks typical of Level 250, such as interpreting graphs and making inferences from experimental results. These results represent a significant increase in the percentages since 1977 at both ages. The percentage of 17-year-olds reaching Level 250 has remained generally constant, at about 80 percent in each of the four assessments from 1977 to 1990.

LEVEL 300: ANALYZES SCIENTIFIC PROCEDURES AND DATA. In both the 1977 and 1990 assessments, very few 9- or 13-year-olds were successful in evaluating the appropriateness of an experimental design or in using detailed scientific knowledge to interpret new information — skills typical of performance at Level 300. Additionally, fewer than half of the 17-year-olds reached this level in either year, although the percentage of students at age 17 who performed at or above this level increased significantly, from 37 to 43 percent, between 1982 and 1990.

LEVEL 350: INTEGRATES SPECIALIZED SCIENTIFIC INFORMATION. Students attaining Level 350 were able to use detailed knowledge from the physical sciences to make inferences and draw conclusions or apply basic genetics principles. Only 9 percent of 17-

year-olds performed at or above this level in 1977 or 1990. Although 9-year-olds probably would not be expected to achieve this level of performance, all but a very few 13-year-olds (1 percent or less) also found this material beyond their grasp in every assessment from 1977 to 1990.

These trends in the levels of science proficiency show that, despite the recent upward trends in average science proficiency presented in the first chapter of this report, very few students are performing at advanced proficiency levels, and virtually no substantial increases in the percentages of students performing at advanced levels occurred from 1977 to 1990. At ages 9 and 13, larger percentages of students are performing at or above Levels 200 and 250, but at age 17, performance at all five levels in 1990 was remarkably similar to that in 1977.

TRENDS IN LEVELS OF SCIENCE PROFICIENCY FROM 1977 TO 1990 BY RACE/ETHNICITY

Trends in the percentages of White, Black, and Hispanic students performing at or above each of the five proficiency levels in 1977 and 1990 are presented in TABLE 2.2.[14] In the 1990 assessment, nearly all 9-year-old White students as well as nearly all 13- and 17-year-old students from all three racial/ethnic groups performed at or above Level 150. In addition, 88 percent of the 9-year-old Black students and 94 percent of the 9-year-old Hispanic students performed at or above Level 150. These results represent significant increases for these two subgroups since 1977.

Significantly greater percentages of White, Black, and Hispanic 9-year-olds and Black and Hispanic 13-year-olds performed at or above Level 200 in 1990 than in 1977. Dramatic improvements were achieved by Black and Hispanic students in these two age groups. At age 9, the percentages of Black and Hispanic students performing at or above Level 200 increased from 27 to 46 percent and from 42 to 56 percent, respectively. At age 13, the increases were from 57 to 78 percent for Black students, and from 62 to 80 percent for Hispanic students. In comparison, the percentages of White 9- and 13-year-olds performing at this level increased from 77 to 84 percent and from 92 to 97 percent, respectively. At age 17, 99 percent of the White students, 92 percent of the Hispanic students, and 88 percent of the Black students reached Level 200 in 1990; these percentages have remained essentially unchanged since 1977.

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[14] Trends in percentages of students performing at or above each of the five levels in all four science assessments by race/ethnicity and gender are presented in the Data Appendix.

In 1990, nearly two-fifths of the 9-year-old White students and approximately one-tenth of the Black and Hispanic students reached Level 250. This represented a significant increase for White 9-year-olds since 1977. A large difference persisted between the percentage of White 9-year-olds and Black or Hispanic 9-year-olds at or above Level 250 in each assessment from 1977 to 1990. At age 13, the percentage of students reaching Level 250 increased significantly (by approximately 10 percentage points) for all three racial/ethnic groups between 1977 and 1990. However, as at age 9, large differences in the percentage of White students and Black or Hispanic students reaching Level 250 persisted in 1990. At age 17, the percentage of Black students reaching Level 250 increased signifi-

TABLE 2.2

Trends in Percentages of Students at or Above Five Science Proficiency Levels by Race/Ethnicity, 1977 to 1990

		ASSESSMENT YEARS					
		1977			1990		
Proficiency Levels	**Age**	**White**	**Black**	**Hispanic**	**White**	**Black**	**Hispanic**
Level 350							
Integrates Specialized Scientific Information	9	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.1)	0 (0.0)	0 (0.0)
	13	1 (0.1)	0 (0.0)	0 (0.1)	1 (0.1)	0 (0.0)	0 (0.1)
	17	10 (0.4)	0 (0.2)	2 (0.6)	11 (0.7)	2 (0.8)	2 (1.6)
Level 300							
Analyzes Scientific Procedures and Data	9	4 (0.3)	0 (0.1)	0 (0.4)	4 (0.4)	0 (0.2)	0 (0.4)
	13	13 (0.5)	1 (0.4)	2 (0.8)	14 (0.8)	2 (0.5)	3 (0.8)
	17	48 (0.7)	8 (1.0)	19 (2.1)	51 (1.5)	16 (4.0)	21 (3.3)
Level 250							
Applies General Scientific Information	9	31 (0.7)*	4 (0.6)	9 (1.7)	38 (1.1)	9 (1.1)	12 (2.1)
	13	57 (0.9)*	15 (1.7)*	18 (1.8)*	67 (1.2)	24 (3.3)	30 (2.8)
	17	88 (0.4)	41 (1.5)*	62 (1.7)	90 (0.8)	51 (3.7)	60 (5.0)
Level 200							
Understands Simple Scientific Principles	9	77 (0.7)*	27 (1.5)*	42 (3.1)*	84 (0.7)	46 (3.1)	56 (3.7)
	13	92 (0.5)	57 (2.4)*	62 (2.4)*	97 (0.4)	78 (3.6)	80 (2.9)
	17	99 (0.1)	84 (1.3)	93 (1.7)	99 (0.2)	88 (1.9)	92 (2.2)
Level 150							
Knows Everyday Science Facts	9	98 (0.3)	72 (1.8)*	85 (1.8)*	99 (0.2)	88 (1.3)	94 (1.5)
	13	100 (0.1)	93 (1.0)	94 (1.3)	100 (0.1)	99 (0.6)	99 (0.6)
	17	100 (0.0)	99 (0.3)	100 (0.2)	100 (0.0)	99 (0.7)	100 (0.9)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous science assessments and 1990. Thus, alpha equals .0167 for each comparison. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the percentage of students is either 0 or 100, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent, and percentages less than 0.5 percent were rounded to 0 percent.

cantly from 1977 to 1990 (from 41 to 51 percent), while the percentages of White and Hispanic students remained relatively constant in 1990, at 90 and 60 percent, respectively.

In 1977 and 1990, very few White, Black, or Hispanic 9-year-olds reached Level 300. In addition, at age 13, very few Black or Hispanic students and only 13 to 14 percent of White students performed at or above this level. At age 17, there was essentially no change in the percentage of students reaching Level 300 between 1977 and 1990 in any of the three racial/ethnic groups. In the most recent assessment, about one-half of the White students, slightly less than one-fifth of the Black students, and about one-fifth of the Hispanic students performed at or above this level. The percentages of 17-year-olds reaching Level 350 also remained unchanged from 1977 to 1990 — only one of 10 White students, and very small percentages of Black and Hispanic students reached Level 350 in both years.

TRENDS IN LEVELS OF SCIENCE PROFICIENCY FROM 1977 TO 1990 BY GENDER

Trends in the percentages of male and female students performing at or above each of the five proficiency levels in 1977 and 1990 are presented in TABLE 2.3.

There was a significant increase between 1977 and 1990 in the percentage of both male and female 9-year-old students at or above Level 200, so that in 1990, nearly all students reached Level 150 and about three-fourths reached Level 200. Also, more than 90 percent of male and female 13-year-olds performed at or above Level 200 in 1990 — a significant increase for both genders since 1977. For Level 250, significant increases since 1977 in the percentages of both male and female 9- and 13-year-olds reflect the trend seen in the results for the nation as a whole. However, there have been no increases in the percentages of 9- or 13-year-old males or females at or above Levels 300 or 350 since 1977, or in the percentages of male or female 17-year-olds at any of the five proficiency levels.

In both 1977 and 1990, there was no gender difference at age 9 in the percentage of students reaching any of the five proficiency levels. In contrast, trends for 13- and 17-year-olds show that some moderate disparities exist between the percentages of male and female students performing at or above the upper three scale levels, with significant differences favoring males occurring for 13-year-olds at Levels 250 and 300 and for 17-year-olds at Levels 300 and 350. These gender differences have remained relatively con-

TABLE 2.3

Trends in Percentages of Students at or Above Five Science Proficiency Levels by Gender, 1977 to 1990

		ASSESSMENT YEARS			
		1977		1990	
Proficiency Levels	**Age**	**Male**	**Female**	**Male**	**Female**
Level 350					
Integrates Specialized Scientific Information	9	0 (0.0)	0 (0.0)	0 (0.1)	0 (0.1)
	13	1 (0.2)	0 (0.1)	1 (0.2)	0 (0.1)
	17	12 (0.6)	5 (0.4)	13 (0.8)	6 (0.5)
Level 300					
Analyzes Scientific Procedures and Data	9	4 (0.3)	3 (0.3)	4 (0.6)	2 (0.3)
	13	13 (0.6)	9 (0.5)	14 (0.9)	9 (0.6)
	17	49 (1.1)	35 (1.0)	48 (1.6)	39 (1.7)
Level 250					
Applies General Scientific Information	9	27 (0.9)*	24 (0.9)*	33 (1.1)	29 (1.0)
	13	52 (1.3)*	45 (1.2)*	60 (1.3)	53 (1.4)
	17	85 (0.7)	78 (1.0)	83 (1.2)	80 (1.4)
Level 200					
Understands Simple Scientific Principles	9	70 (1.2)*	67 (1.1)*	76 (1.2)	76 (1.1)
	13	87 (0.8)*	85 (0.8)*	93 (0.8)	92 (0.8)
	17	98 (0.2)	96 (0.3)	97 (0.5)	97 (0.6)
Level 150					
Knows Everyday Science Facts	9	94 (0.5)	93 (0.7)	97 (0.5)	97 (0.4)
	13	99 (0.2)	98 (0.2)	100 (0.1)	100 (0.2)
	17	100 (0.0)	100 (0.1)	100 (0.2)	100 (0.2)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous science assessments and 1990. Thus, alpha equals .0167 for each comparison. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the percentage of students is either 0 or 100, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent, and percentages less than 0.5 percent were rounded to 0 percent.

stant from 1977 to 1990 and support research studies showing that gender differences in science achievement amplify as students grow older and the material becomes more difficult.[15]

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[15] Marlaine E. Lockheed, et al., *Sex and Ethnic Differences: Middle School Mathematics, Science, and Computer Science: What Do We Know?* (Princeton, NJ: Educational Testing Service, 1985).

SUMMARY In 1990, nearly all 9-year-olds performed at or above Level 150, about three-fourths performed at or above Level 200, and almost one-third performed at or above Level 250. These results represent significant gains at Levels 200 and 250 compared to 1977, indicating that in the nation as a whole, 9-year-olds in 1990 were better able to move beyond the knowledge of basic scientific facts and begin to understand scientific principles and apply their knowledge of science than they were 13 years earlier. Gains at Level 200 were achieved by both males and females and by White, Black, and Hispanic 9-year-olds. However, significant differences still exist among the percentages of White, Black, and Hispanic students who are able to demonstrate the abilities typical of Levels 200 and 250 at age 9. Only a small number of male, female, White, Black, or Hispanic 9-year-olds reached Levels 300 or 350 in either 1977 or 1990.

Nearly all 13-year-olds demonstrated basic scientific knowledge (Level 150) in 1977 and 1990. In 1990, more than 90 percent of the 13-year-olds demonstrated an understanding of simple principles typical of Level 200 performance — a significant increase since 1977. More than half displayed success in applying scientific knowledge (Level 250) — also a significant increase since 1977. Only 10 percent of 13-year-olds performed at or above Level 300 in 1990 — about the same percentage as in 1977. Virtually no 13-year-olds performed at or above Level 350 in 1977 or 1990. The recent gains by 13-year-olds at Levels 200 and 250 were achieved by both males and females, as well as by Black and Hispanic students. However, greater percentages of White students still performed at Levels 200 and 250 than did Black or Hispanic students. In addition, a moderate difference in the percentages of male and female students at or above Level 250 persisted in 1990. Similar gender and race/ethnicity differences also were observed in 1990 for Level 300.

At age 17, there was no change in the percentage of students at or above any of the five proficiency levels from 1977 to 1990. In both years, nearly all 17-year-olds performed at or above Level 200, and about four-fifths performed at or above Level 250. In addition, in both years slightly more than 40 percent of the 17-year-olds demonstrated the knowledge and skills typical of Level 300, while fewer than one in 10 demonstrated the most advanced abilities typical of Level 350. The results by gender paralleled those for the nation as a whole, although in 1977 and 1990 a greater percentage of males performed at or above Levels 300 and 350 than did females. In general, no increases in the percentages of 17-year-olds from the three racial/ethnic groups at any proficiency level occurred between 1977 and 1990, with the exception of a significant increase in the percentage of Black 17-year-olds performing at or above Level 250. In each assessment, a greater percentage of White students reached each of the highest three proficiency levels than did their Black or Hispanic counterparts.

The signs of recent progress in average proficiency were clearly evident in the two younger age groups at the lower levels on the scale. Larger percentages of the nation's 9- and 13-year-olds were able to understand simple scientific principles and apply their scientific knowledge in 1990 than in 1977. Black and Hispanic students in these two age groups made particularly significant gains in these Level 200 and 250 skills across the past 13 years. However, from 1977 to 1990, virtually no progress was achieved by 17-year-olds at any of the five proficiency levels. The percentages of students demonstrating higher-level science understanding remained small, and fewer females than males as well as fewer minority students than White students performed at or above the highest two proficiency levels. While progress at the lower proficiency levels is occurring, relatively few students are leaving high school with advanced knowledge and skills in science.

CHAPTER THREE

TRENDS IN STUDENTS' EXPERIENCES IN SCIENCE AND ATTITUDES TOWARD SCIENCE

INTRODUCTION

Improving the quality of science education in our nation's schools has been the focus of several recent educational reform efforts.[16] These projects have emphasized the need for an increase in the amount of time devoted to science in elementary classrooms, accentuated by "hands-on" science experiences that provide students opportunities to become actively involved in "doing" science at an early stage in their education. The recommended reforms also stress increasing the number and quality of science courses available to high school students and emphasizing ways to enhance students' abilities to integrate knowledge and skills across the traditional science content areas. Further, the reforms have called for renewed attention to studying science applications in practical, real-world settings and to fostering positive attitudes toward science. Additionally, they have emphasized the importance of designing learning activities and assessment exercises that mirror the activities of scientists. These reforms provide a blueprint for improving the scientific literacy of all students as well as for retaining a higher proportion of students in the pipeline leading to further science study.

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[16] *Educating Scientists and Engineers: Grade School to Grad School* (Washington, DC: Office of Technology Assessment, 1988).

Science for All Americans: A Project 2061 Report on Literacy Goals in Science, Mathematics, and Technology (Washington, DC: American Association for the Advancement of Science, 1989).

Fulfilling the Promise: Biology Education in the Nation's Schools (Washington, DC: National Research Council, Committee on High School Biology Education, 1990).

Assessment in the Service of Instruction (Washington, DC: American Association for the Advancement of Science, 1990).

This chapter presents trends at age 9 in the frequency of participation in several science activities, trends in science course taking by 17-year-olds, and trends in 13- and 17-year-olds' attitudes about the value of science and its applications in solving world problems.

TRENDS IN SCIENCE ACTIVITIES AT AGE 9 FROM 1977 TO 1990

Experience with science activities in the elementary grades engages students' interest in science and provides a foundation for the development of the observational and measurement skills needed to design and conduct scientific experiments.[17] TABLE 3.1 summarizes 9-year-old students' reports of their participation in six different science activities in 1977 and 1990.

In 1990, most 9-year-olds reported having used a scale, a thermometer, and a calculator. More than half reported having used a microscope and having done experiments with living plants, and about half reported having done experiments with batteries and bulbs. The percentages of 9-year-olds reporting having used a thermometer and a microscope were significantly greater in 1990 than in 1977, while the percentage who had done experiments with living plants decreased significantly. The percentages of students who had used a scale or done experiments with batteries and bulbs did not change significantly from 1977 to 1990. Although the number of activities considered here is limited, it appears that in 1990 more 9-year-olds had used measuring instruments and other equipment than was the case in 1977.

In both 1977 and 1990, the average science proficiency of students who reported having performed each of the six activities was significantly higher than that of students who had not performed these activities (with one exception — in 1977, the proficiency of students who had experimented with living plants was about the same as that of students who had not). These data are consistent with the prevailing view among science educators that improved science learning is related to instruction that involves experimentation and the use of laboratory equipment.

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[17] Rodger W. Bybee, et al., *Science and Technology Education for the Elementary Years: Frameworks for Curriculum and Instruction* (Washington, DC: The National Center for Improving Science Education, 1988).

TABLE 3.1

Trends in Science Activities at Age 9, 1977 to 1990

		STUDENTS ANSWERING "YES"		STUDENTS ANSWERING "NO"	
Have you ever . . .	**Year**	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**
Experimented with living plants?	1990	64 (1.4)	234 (1.5)	33 (1.3)	223 (2.5)
	1977	70 (1.4)*	221 (2.3)*	27 (1.3)*	217 (2.8)
Experimented with batteries & bulbs?	1990	47 (1.7)	234 (2.0)	47 (1.7)	228 (1.9)
	1977	51 (1.4)	225 (2.8)*	43 (1.4)	217 (2.1)*
Used a scale to weigh things?	1990	89 (0.9)	232 (1.2)	9 (0.8)	216 (4.4)
	1977	89 (0.8)	220 (2.3)*	9 (0.7)	202 (4.5)
Used a thermometer?	1990	91 (1.0)	232 (1.3)	8 (0.9)	209 (5.1)
	1977	84 (1.0)*	222 (2.2)*	14 (0.9)*	199 (2.7)
Used a microscope?	1990	63 (1.7)	236 (1.4)	33 (1.5)	222 (1.9)
	1977	53 (1.4)*	222 (2.5)*	43 (1.5)*	214 (2.1)*
Used a calculator?	1990	97 (0.4)	231 (1.3)	2 (0.4)	203 (9.1)
	1977	87 (1.2)	222 (2.2)*	11 (1.0)	195 (3.4)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous science assessments and 1990. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding, and because small percentages of students responded "I don't know."

TRENDS IN SCIENCE COURSE TAKING AT AGE 17 FROM 1982 TO 1990 Increased enrollments in high school courses are considered to be essential for improving students' preparation for advanced training in science and for functioning as responsible citizens in an increasingly technological society.[18] To monitor trends in science course taking, NAEP asked 17-year-olds about the extent of their course taking in each of the three most recent assessments, although the wording of the question was changed slightly in 1990.[19] The results are presented in TABLE 3.2.

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[18] *Educating Scientists and Engineers: Grade School to Grad School* (Washington, DC: Office of Technology Assessment, 1988).

[19] In 1982 and 1986, students were asked, "How much have you studied the following subjects?" In 1990, however, students were asked "Since the beginning of the ninth grade, how long have you studied the following subjects?" Thus, in 1982 and 1986 students may have included courses taken before ninth grade in their answers to this question, and care should be taken in interpreting trends.

TABLE 3.2
Trends in Science Course Taking at Age 17, 1982 to 1990

17-Year-Olds' Reports of Different Subjects Studied for One Year or More ‡

	PERCENT OF STUDENTS					
Subject	**Total**	**Male**	**Female**	**White**	**Black**	**Hispanic**
General Science						
1990	56 (2.2)	60 (2.7)	53 (2.4)	56 (2.3)	58 (4.4)	69 (7.3)
1986	69 (1.6)*	71 (2.1)*	67 (1.9)*	71 (1.7)*	62 (2.8)	64 (3.2)
1982	61 (1.6)	63 (1.7)	59 (1.6)	61 (1.8)	66 (2.2)	58 (1.9)
Life Science						
1990	30 (1.8)	32 (2.0)	28 (2.3)	28 (1.8)	35 (5.5)	44 (7.5)
1986	40 (2.0)*	45 (2.5)*	34 (2.1)	40 (2.1)*	40 (3.7)	41 (4.7)
1982	27 (1.1)	29 (1.2)	26 (1.3)	27 (1.2)	27 (2.9)	31 (4.0)
Physical Science						
1990	41 (3.0)	42 (3.0)	40 (3.4)	39 (2.9)	47 (6.3)	55 (10.0)
1986	41 (3.0)	43 (3.2)	40 (3.4)	41 (3.5)	45 (3.5)	37 (3.9)
1982	33 (2.1)*	33 (2.1)*	33 (2.3)	32 (2.3)	34 (4.2)	35 (11.2)
Earth and Space Science						
1990	35 (2.2)	35 (2.0)	34 (2.6)	34 (2.3)	35 (4.3)	38 (9.3)
1986	38 (1.8)	41 (2.3)	34 (2.2)	38 (2.2)	44 (3.5)	23 (3.0)
1982	27 (1.9)*	30 (1.9)	25 (2.1)*	28 (2.1)	28 (2.8)	20 (2.6)
Biology						
1990	85 (1.5)	82 (2.1)	87 (1.4)	86 (1.7)	79 (3.2)	78 (8.7)
1986	80 (1.8)	78 (2.3)	82 (1.8)	81 (2.3)	77 (2.8)	70 (3.7)
1982	76 (1.7)*	74 (1.7)*	78 (1.9)*	78 (2.0)*	66 (2.0)*	62 (8.3)
Chemistry						
1990	42 (1.5)	40 (1.9)	45 (1.7)	44 (2.1)	36 (3.4)	26 (7.2)
1986	33 (1.7)*	34 (2.2)	31 (2.1)*	35 (2.0)*	23 (2.5)*	16 (2.8)
1982	31 (1.7)*	31 (1.6)*	30 (2.0)*	33 (1.9)*	19 (1.6)*	13 (2.6)
Physics						
1990	10 (0.9)	12 (1.0)	9 (1.1)	9 (1.0)	13 (2.2)	11 (4.6)
1986	11 (0.9)	13 (1.4)	8 (1.3)	11 (1.1)	9 (1.2)	7 (2.3)
1982	11 (0.9)	14 (1.2)	9 (0.9)	11 (1.0)	12 (1.3)	9 (1.9)

‡ The information reported in this table for 17-year-olds in 1990 was obtained from a different, but comparable, sample of 17-year-olds than the sample from which all other information for 17-year-olds in 1990 was obtained.

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous science assessments and 1990. The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

In 1990, only general science and biology were studied for at least one year by more than half of the 17-year-olds, and only one in 10 students reported having studied physics for a year or more. Many students are apparently still not obtaining a broad education in science before completing their high school education. However, significantly higher percentages of students reported having studied physical science, earth and space science, biology, and chemistry in 1990 than in 1982. Large increases occurred in biology and chemistry, often taught in grades 10 and 11, indicating that greater percentages of students were enrolled in high-school science courses in 1990 than in 1982. These national trends in biology and chemistry course taking were similar for both males and females and for White and Black students. However, between 1986 and 1990, there was a particularly notable increase in the percentage of female students and Black students who reported having taken a year or more of chemistry.

Between 1986 and 1990, the results show decreases in the percentages of students who reported having studied either general science or life science for one year or more. However, because life science and general science courses are offered to some seventh- and eighth-grade students, the decrease may have resulted from the change in the wording of the question in 1990 and results from prior assessments may reflect the study of these subjects before ninth grade.

TRENDS IN ATTITUDES ABOUT SCIENCE AT AGES 13 AND 17 FROM 1977 TO 1990

Science educators consider developing positive attitudes about science and helping students to understand the role of scientists in society to be important in encouraging students to continue on to advanced studies.[20] In the NAEP science assessments, 13- and 17-year-old students were asked whether they agreed with three statements relating to the value of science in their lives. The results are summarized in TABLE 3.3.

In 1977 and 1990, only slightly more than half of the students believed that science was useful in their everyday lives. However, in both assessments, about two-thirds of the 17-year-olds and three-fourths of the 13-year-olds believed that what they learned in science classes would be useful to them in the future. Interestingly, the percentage of 17-year-olds agreeing with this latter statement was smaller than the percentage of 13-year-olds, despite the fact that the 17-year-olds were likely to have taken more science

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[20] *Science for All Americans: A Project 2061 Report on Literacy Goals in Science, Mathematics, and Technology* (Washington, DC: American Association for the Advancement of Science, 1989).

Jon D. Miller, "The Development of Interest in Science" in *High-School Biology Today and Tomorrow*, Walter G. Rosen, editor (Washington, DC: National Academy Press, 1989).

TABLE 3.3

Trends in Attitudes About the Value of Science at Ages 13 and 17, 1977 to 1990

	Age	Year	STRONGLY AGREE OR AGREE		UNDECIDED, DISAGREE, OR STRONGLY DISAGREE	
			Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Much of what you learn in science classes is useful in everyday life.	13	1990	52 (1.3)	251 (3.0)	48 (1.3)	256 (2.3)
		1977	58 (1.4)*	249 (2.3)	43 (1.4)*	256 (2.1)
	17	1990	52 (1.3)	292 (3.4)	48 (1.3)	286 (1.9)
		1977	53 (1.2)	290 (2.4)	47 (1.2)	293 (1.8)*
Much of what you learn in science classes will be useful in the future.	13	1990	72 (1.2)	254 (2.3)	28 (1.2)	252 (3.1)
		1977	75 (1.2)	251 (2.1)	26 (1.2)	255 (2.8)
	17	1990	66 (1.4)	294 (3.0)	34 (1.4)	280 (2.1)
		1977	65 (1.3)	292 (2.0)	35 (1.3)	290 (2.0)*
Science should be required in school.	13	1990	72 (1.2)	254 (2.3)	28 (1.2)	251 (3.0)
		1977	70 (1.2)	252 (2.1)	30 (1.2)	252 (2.5)
	17	1990	75 (1.3)	295 (2.7)	25 (1.3)	274 (2.3)
		1977	62 (1.1)*	292 (2.0)	38 (1.1)*	291 (2.4)*

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous science assessments and 1990. The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

courses. The only changes in these attitudes between 1977 and 1990 were a decrease in the percentage of 13-year-olds who felt that what they learned in science class was useful in their everyday lives and an increase in the percentage of 17-year-olds who believed that science should be required in school — an increase that occurred concurrently with an increase in biology and chemistry course taking.

In 1977, there was no relationship between average science proficiency and students' responses to the statements about the value of science at either age 13 or 17. In 1990, this was also the case at age 13, but 17-year-old students who felt that science should be required in school or that science would be useful in the future had a higher proficiency than did students who did not share these views.

Thirteen- and 17-year-old students also were asked about their perceptions of useful applications of science. Results for 1977 and 1990 are summarized in TABLE 3.4. In 1990, a majority of 13- and 17-year-olds believed that science could play a prominent role in helping cure diseases and solving environmental problems, such as energy shortages

TABLE 3.4

Trends in Perceived Applications of Science at Ages 13 and 17, 1977 to 1990

		PERCENT RESPONDING "VERY MUCH"	
How much do you think that the application of science can help . . .	**Year**	**Age 13**	**Age 17**
Prevent world starvation?	1990	21 (1.1)	29 (1.3)
	1977	32 (1.5)*	51 (1.2)*
Save us from an energy shortage?	1990	64 (1.1)	74 (1.5)
	1977	54 (1.7)*	70 (1.0)
Find cures for diseases?	1990	72 (0.9)	84 (0.9)
	1977	70 (1.5)	85 (0.8)
Control weather?	1990	20 (0.8)	16 (1.0)
	1977	15 (0.9)*	16 (0.8)
Prevent birth defects?	1990	36 (1.2)	52 (1.5)
	1977	23 (1.2)*	44 (1.2)*
Save our natural resources?	1990	57 (1.0)	61 (1.1)
	1977	47 (1.1)*	48 (1.2)*
Reduce air and water pollution?	1990	54 (1.4)	59 (1.2)
	1977	44 (1.2)*	54 (1.2)*

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous science assessments and 1990. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

and the depletion of natural resources. In contrast, relatively few students perceived that applications of science could do much to prevent world starvation or control weather.

For five of the seven problems listed in the table, the percentage of 13-year-olds who responded that science could help "very much" was significantly greater in 1990 than in 1977, indicating that the perceptions of 13-year-olds about the potential applications of science have become more positive during the past 13 years. In 1990, only on the problem of preventing world hunger did 13- and 17-year-old students have less optimism about the positive impact of science.

SUMMARY During the 13-year period from 1977 to 1990, several important positive trends were observed — both in the prevalence of students' science experiences and coursework and in their attitudes toward science.

In 1990, a larger percentage of 9-year-olds responded that they had used a microscope and a thermometer than in 1977, which may indicate an increase in student access to such equipment. However, there was no concomitant increase in the percentage of students who had performed classroom experiments with living plants or batteries and bulbs. In 1990, the average proficiency of 9-year-olds who reported having used the scientific equipment or having performed either of the scientific experiments was significantly greater than the average proficiency of students who had not.

In 1990, higher percentages of 17-year-olds reported having studied biology, chemistry, earth and space science, and physical science than in 1982. However, less than half of the 17-year-olds had studied chemistry for a year or more and only 10 percent had studied physics for that length of time.

Attitudes of 13- and 17-year-olds about the usefulness of science in their lives have changed little since 1977, with an important exception. In 1990, a larger percentage of 17-year-olds believed that science should be required in school. In both 1977 and 1990, only slightly more than half of the 13- and 17-year-olds felt that science was useful in their everyday lives. In 1990, greater percentages of 13- and 17-year-olds than in 1977 perceived that applications of science could help solve environmental problems. However, fewer believed that science applications had much to offer in helping to prevent world starvation.

These trends indicate that across the past decade, science appears to be gaining an increasingly prominent place in students' lives. At the younger ages, more students are using some types of scientific equipment and at the older ages, they are taking more coursework and developing more positive attitudes about the value of science and the applications of science.

MATHEMATICS
1973 to 1990

BEST COPY AVAILABLE

PART II

TRENDS IN MATHEMATICS ACHIEVEMENT FROM 1973 TO 1990

INTRODUCTION

NAEP's mathematics assessments have served as a barometer monitoring trends in the mathematical proficiency of our nation's students since 1973. There have been five assessments, conducted in the 1972-73, 1977-78, 1982-83, 1985-86, and 1989-90 school years, which subsequently will be referred to by the last half of the school year in which they occurred. Each of these five mathematics assessments involved nationally representative samples of 9-year-olds, 13-year-olds, and 17-year-olds attending school.

Because the 1980s ushered in a time of heightened concern about the ability of American youth to compete internationally or even maintain their level of mathematics performance nationally, shifts in students' performance and changes in background variable patterns from those noted in prior assessments have served as markers of progress in improving the effectiveness of school mathematics.[21] Concerns about the gap between students' achievement and needs in today's technological society were rapidly followed by a number of publications calling for significant changes in both the content and teaching of mathematics in our nation's schools.[22] As a result, more than in any other period since the inception of NAEP, there is a concerted push for change in the mathematics curriculum.

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[21] John A. Dossey, Ina V.S. Mullis, Mary M. Lindquist, and Donald L. Chambers, *The Mathematics Report Card: Are We Measuring Up?* (Princeton, NJ: Educational Testing Service, 1988).

Curtis McKnight, et al., *The Underachieving Curriculum: Assessing U.S. School Mathematics from an International Perspective, A National Report on the Second International Mathematics Study* (Champaign, IL: International Association for the Evaluation of Education Achievement, Stipes Publishing Company, 1987).

Most recently, improving mathematics achievement gained prominence in six national education goals adopted by the president and governors.[23] One of these goals includes a call for children at grades 4, 8, and 12 to demonstrate competence in challenging mathematics subject matter, and another calls for the United States to be first in the world in mathematics and science achievement by the year 2000.

The trend results from the NAEP mathematics assessments between 1973 and 1990 provide an opportunity to determine whether any progress is being made in raising students' proficiency levels and whether any changes appear to be occurring from a curricular standpoint. The assessment materials included a range of tasks, from those requiring knowledge of number facts, use of simple measurement instruments, and ability to read charts and graphs to those involving multi-step problem solving and reasoning, fractions, percents, geometric figures, exponents, square roots, algebraic expressions, linear equations, functions, and coordinate systems. To measure performance trends, subsets of the same questions have been included in several successive assessments. Some questions have been included in all five assessments.

The results from the NAEP mathematics trend assessments provide a wide range of information about the proficiency of 9-, 13-, and in-school 17-year-olds on a 0 to 500 scale. The scale provides a common metric for comparing performance across assessments, age groups, and demographic subpopulations. NAEP has also characterized student performance at five levels on the scale: Level 150 — Simple Arithmetic Facts, Level 200 — Beginning Skills and Understandings, Level 250 — Basic Operations and Beginning Problem Solving, Level 300 — Moderately Complex Procedures and Reasoning, and Level 350 — Multi-Step Problem Solving and Algebra.

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[22] *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

Professional Standards for Teaching Mathematics (Reston, VA: National Council of Teachers of Mathematics, 1991).

Reshaping School Mathematics: A Philosophy and Framework for Curriculum (Washington, DC: Mathematical Sciences Education Board and National Research Council, National Academy Press, 1990).

Everybody Counts: A Report to the Nation on the Future of Mathematics Education, Lynn Steen, editor (Washington, DC: National Research Council, National Academy Press, 1989).

Moving Beyond Myths: Revitalizing Undergraduate Mathematics (Washington, DC: National Research Council, National Academy Press, 1991).

[23] *America 2000: An Education Strategy* (Washington, DC: U.S. Department of Education, 1991).

The NAEP mathematics scale used for monitoring trends in proficiency as discussed in this report should not be confused with the newly developed NAEP mathematics scale used to report student performance on the 1990 assessment at grades 4, 8, and 12, and to report the results of the 1990 Trial State Assessment Program in mathematics conducted at grade 8 across 40 participating states and jurisdictions.[24] While the trend scale was constructed in 1986 to report trends across previous mathematics assessments, the new scale was constructed in 1990 on the basis of updated specifications and materials formulated to serve as the foundation for a new NAEP mathematics trend line beginning in 1990. However, NAEP plans to continue reporting results on both scales in 1992.

Because the statistics presented in this report are estimates of group and subgroup performance based on samples of students, it is helpful to have measures of the degree of uncertainty associated with each estimate. Thus, the percentages of students and their proficiencies provided in this report are accompanied by standard errors shown in parentheses. Also, the report denotes statistically significant trend differences at the .05 level with an asterisk or a dagger (see Procedural Appendix for details).

The mathematics section of this report includes three chapters. Chapter 4 presents trends in average mathematics proficiency for students at ages 9, 13, and 17, while Chapter 5 presents trends in performance at each of five levels on the proficiency scale. Chapter 6 contains trend information about some instructional and experiential background variables.

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[24] Ina V.S. Mullis, John A. Dossey, Eugene H. Owen, and Gary W. Phillips, *The State of Mathematics Achievement: NAEP's 1990 Assessment of the Nation and the Trial Assessment of the States* (Washington, DC: National Center for Education Statistics, 1991).

Ina V.S. Mullis, *The NAEP Guide* (Princeton, NJ: Educational Testing Service, 1990).

CHAPTER FOUR

TRENDS IN MATHEMATICS PROFICIENCY FOR THE NATION AND DEMOGRAPHIC SUBPOPULATIONS

NATIONAL TRENDS IN MATHEMATICS PROFICIENCY FROM 1973 TO 1990

FIGURE 4.1 provides an overall picture of changes in the average mathematical proficiency of 9-, 13-, and in-school 17-year-olds across the 17-year period from 1973 to 1990. The results for the 1978, 1982, 1986, and 1990 assessments are based on recent analyses to provide scaled results for the data collected in these assessments, while the results for the 1973 assessment (see dotted line) are extrapolated from previous NAEP analyses.[25] (Please refer to the Procedural Appendix for details about the scaling methodology and for information about drawing inferences from the trend analyses.)

The data from the 1990 NAEP mathematics assessment indicate a statistically significant upturn in the mathematical proficiency of the nation's 9-year-olds between

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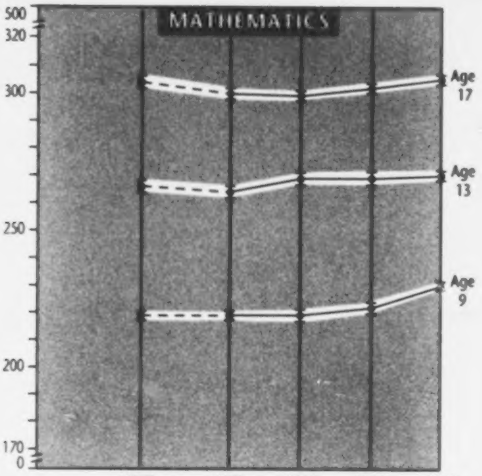
[25] The results of statistical tests between various assessment years using multiple-comparisons procedures are indicated on Figure 4.1. These tests were supported by tests for linear and quadratic trends. At age 9, there was a significant linear and quadratic trend in average performance. For 13-year-olds, the trend across time was an essentially linear increase, while at age 17 the quadratic term was statistically significant and the linear term was not.

FIGURE 4.1

Trends in Average Mathematics Proficiency for the Nation, 1973 to 1990



	1973	1978	1982	1986	1990
Age 17	304(1.1)	300(1.0)*	299(0.9)*†	302(0.9)	305(0.9)
Age 13	266(1.1)*	264(1.1)*	269(1.1)	269(1.2)	270(0.9)†
Age 9	219(0.8)*	219(0.8)*	219(1.1)*	222(1.0)*	230(0.8)†

I 95 percent confidence interval. [- - -] Extrapolated from previous NAEP analyses.

* Statistically significant difference from 1990 and † statistically significant difference from 1973, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 7 comparisons. The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

1986 and 1990. As a result of this recent gain, the average mathematical proficiency of 9-year-olds in 1990 was significantly higher than in any previous assessment.

At age 13, the 1990 results also reflected a significant gain in performance since 1973. Average proficiency in 1990 was significantly higher than in either 1973 or 1978.

After significant declines during the 1970s, student performance at age 17 returned to the original level during the 1980s. Seventeen-year-olds attending school showed significant progress between 1982 and 1990.

Overall, the trend data for the three age groups reflect a general pattern of growth during the 1980s. The significant gain at age 9 since 1986 was accompanied by less dramatic, but steady improvement for 13-year-olds since 1978 and 17-year-olds since

1982. The direct sources of these generally positive results are not discernible from the data. However, many have called for the 1980s and 1990s to be a time of change in school mathematics, and this increased visibility, along with the implementation of specific programs at the state, district, and school levels, may be starting to have an impact in classrooms.[26]

TRENDS IN MATHEMATICS PROFICIENCY FROM 1973 TO 1990 BY RACE/ETHNICITY

The trends in average performance by racial/ethnic groups are presented in FIGURE 4.2. Since 1973, White, Black, and Hispanic 9-year-olds all have shown significant improvement in average mathematics proficiency (11, 18, and 12 scale points, respectively). However, much of this improvement occurred between 1982 and 1990.

At age 13, both Black and Hispanic students showed significant gains across the 17-year period. In contrast, the performance of White 13-year-olds has been relatively constant across assessments, although they too showed statistically significant improvement since 1978.

At age 17, White students showed significant improvement during the 1980s, recovering from a decline during the 1970s, whereas Black 17-year-olds made significant gains from 1973 to 1990. Hispanic students also appeared to show improvement, between 1973 and 1990, but the increase in average proficiency was not statistically significant.

While the growth in average mathematics proficiency is positive, there were large discrepancies between the achievement of White students and that of their Black or Hispanic agemates. The results across assessments show that considerable progress has been made in closing many of these gaps, but that progress in narrowing the performance differences between White students and Black and Hispanic students made in the 1970s

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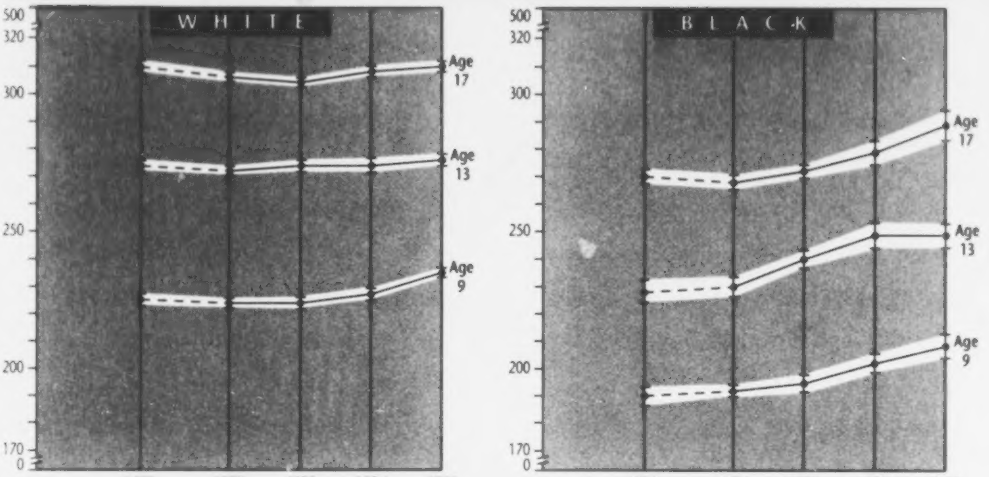
[26] *An Agenda for Action: Recommendations for School Mathematics of the 1980s* (Reston, VA: National Council of Teachers of Mathematics, 1980).

Curriculum and Evaluation Standards for School Mathematics (Reston, VA: National Council of Teachers of Mathematics, 1989).

Reshaping School Mathematics: A Philosophy and Framework for Curriculum (Washington, DC: Mathematics Science Education Board and National Research Council, National Academy Press, 1990).

FIGURE 4.2
Trends in Average Mathematics Proficiency by Race/Ethnicity, 1973 to 1990

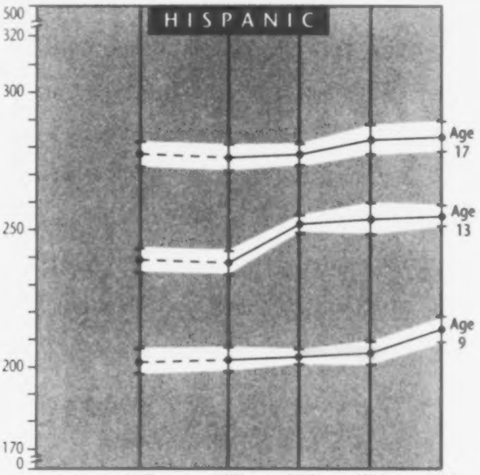


WHITE

	1973	1978	1982	1986	1990
Age 17	**310(1.1)**	**306(0.9)†**	**304(0.9)*†**	**308(1.0)**	**310(1.0)**
	—	83(1.3)*	81(2.0)*	78(0.5)*†	73(0.5)†
Age 13	**274(0.9)**	**272(0.8)***	**274(1.0)**	**274(1.3)**	**276(1.1)**
	—	80(1.7)*	79(2.1)*	77(1.0)	73(0.7)†
Age 9	**225(1.0)***	**224(0.9)***	**224(1.1)***	**227(1.1)***	**235(0.8)†**
	—	79(1.4)	79(2.5)	77(1.1)	75(1.1)

BLACK

	1973	1978	1982	1986	1990
Age 17	**270(1.3)***	**268(1.3)***	**272(1.2)***	**279(2.1)*†**	**289(2.8)†**
	—	12(1.1)*	13(1.7)	14(0.3)*	16(0.3)†
Age 13	**228(1.9)***	**230(1.9)***	**240(1.6)*†**	**249(2.3)†**	**249(2.3)†**
	—	13(1.5)	14(1.8)	14(0.9)	16(0.3)
Age 9	**190(1.8)***	**192(1.1)***	**195(1.6)***	**202(1.6)†**	**208(2.2)†**
	—	14(1.4)	14(2.0)	15(0.5)	16(0.7)



HISPANIC

	1973	1978	1982	1986	1990
Age 17	**277(2.2)**	**276(2.3)**	**277(1.8)**	**283(2.9)**	**284(2.9)**
	—	4(0.5)	5(1.0)	6(0.3)	7(0.4)
Age 13	**239(2.2)***	**238(2.0)***	**252(1.7)†**	**254(2.9)†**	**255(1.8)†**
	—	6(0.9)	5(1.2)	7(1.1)	7(0.5)
Age 9	**202(2.4)***	**203(2.2)***	**204(1.3)***	**205(2.1)**	**214(2.1)†**
	—	5(0.7)	5(1.1)	6(1.1)	6(0.6)

Note: Average proficiencies are in **bold face** type. For each age, the second row of data lists the percentages of students in the total population from each subgroup. Unavailable data are shown by dashes (—).

⫫ 95 percent confidence interval. [- - -] Extrapolated from previous NAEP analyses.

* Statistically significant difference from 1990 and † statistically significant difference from 1973 (for proficiencies) or 1978 (for percentages), as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages do not total 100 percent because Asian/Pacific Islander and American Indian student data were analyzed separately. For Asian/Pacific Islander students and American Indian students, the sample sizes were insufficient to permit robust trend estimates.

was arrested in more recent assessments (except for between White and Black 17-year-olds). As indicated by findings in other NAEP mathematics assessments, differential delivery of the curriculum in many school settings can result in limiting the number of Black or Hispanic students who have the opportunity to be exposed to or learn significant concepts in mathematics.[27] Continual efforts need to be made to give all students equal opportunities to learn mathematics.[28]

TRENDS IN MATHEMATICS PROFICIENCY FROM 1973 TO 1990 BY GENDER

FIGURE 4.3 presents the trends in average mathematics proficiency by gender. At age 9, both male and female students made significant gains in 1990 compared to their levels of performance in 1973, with the improvement generally occurring during the 1980s. As in previous assessments, male and female 9-year-olds had approximately the same level of average mathematics proficiency in 1990.

Thirteen-year-olds of both genders showed improvement between 1978 and 1990. Similar to the findings at age 9, there has been essentially no difference in performance between the two groups in any assessment.

At age 17, the average performance of males declined significantly during the 1970s and then improved significantly during the 1980s, returning essentially to the initial level. The trend results for females show the same pattern, but their gains during the 1980s were somewhat larger than those of their male counterparts. Thus, the performance gap between the genders has narrowed slightly, but not significantly, across the assessments. These results may indicate that efforts to encourage both enrollment and retention of female students in high school mathematics courses are paying off. However, concerns remain about differential treatment between male and female students within those courses, because fewer women than men pursue graduate degrees or careers in mathematics.[29]

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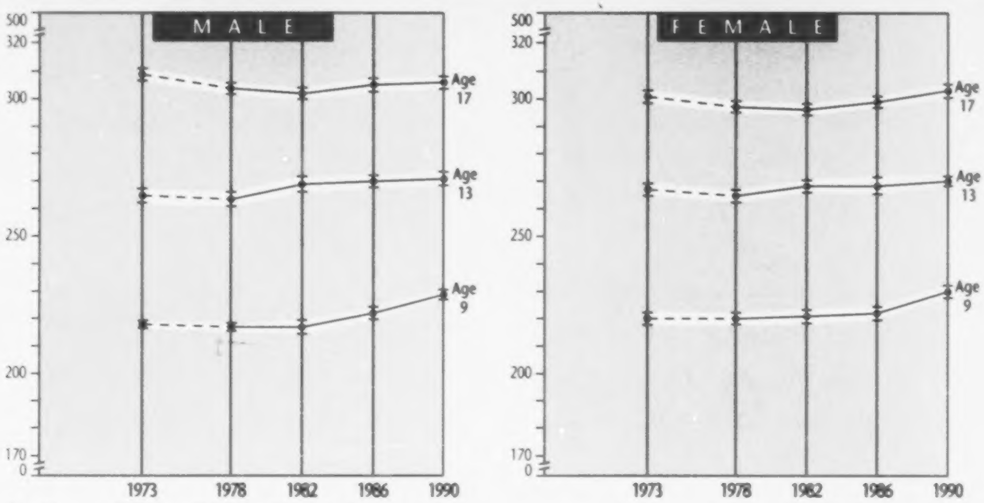
[27] Ina V.S. Mullis, John A. Dossey, Eugene H. Owen, and Gary W. Phillips, *The State of Mathematics Achievement: NAEP's 1990 Assessment of the Nation and the Trial Assessment of the States* (Washington, DC: National Center for Education Statistics, 1991).

[28] *Everybody Counts: A Report to the Nation on the Future of Mathematics Education*, Lynn Steen, editor (Washington, DC: National Research Council, National Academy Press, 1989).

[29] Elizabeth Fennema, "Justice, Equity, and Mathematics Education" in *Mathematics and Gender*, Elizabeth Fennema and Gilah C. Leder, editors (New York, NY: Teachers College Press, 1990).

Moving Beyond Myths: Revitalizing Undergraduate Mathematics (Washington, DC: National Research Council, National Academy Press, 1991).

FIGURE 4.3
Trends in Average Mathematics Proficiency by Gender, 1973 to 1990



	MALE 1973	MALE 1978	MALE 1982	MALE 1986	MALE 1990	FEMALE 1973	FEMALE 1978	FEMALE 1982	FEMALE 1986	FEMALE 1990
Age 17	**309**(1.2)	**304**(1.0)†	**302**(1.0)*†	**305**(1.2)	**306**(1.1)	**301**(1.1)	**297**(1.0)*	**296**(1.0)*†	**299**(1.0)	**303**(1.1)
	—	49(0.5)	49(0.6)	49(1.2)	49(0.9)	—	51(0.5)	51(0.6)	51(1.2)	51(0.9)
Age 13	**265**(1.3)*	**264**(1.3)*	**269**(1.4)	**270**(1.1)†	**271**(1.2)†	**267**(1.1)	**265**(1.1)*	**268**(1.1)	**268**(1.5)	**270**(0.9)
	—	50(0.5)	50(0.4)	50(0.9)	50(0.6)	—	50(0.5)	50(0.4)	50(0.9)	50(0.6)
Age 9	**218**(0.7)*	**217**(0.7)*	**217**(1.2)*	**222**(1.1)*†	**229**(0.9)†	**220**(1.1)*	**220**(1.0)*	**221**(1.2)*	**222**(1.2)*	**230**(1.1)†
	—	50(0.5)	49(0.6)	50(0.6)	49(0.6)	—	50(0.5)	51(0.6)	50(0.6)	51(0.6)

Note: Average proficiencies are in **bold face** type. For each age, the second row of data lists the percentages of students in the total population from each subgroup. Unavailable data are shown by dashes (—).

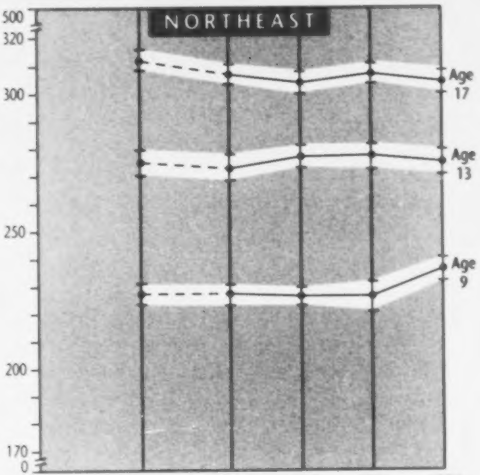
Ī 95 percent confidence interval. [- - -] Extrapolated from previous NAEP analyses.

* Statistically significant difference from 1990 and † statistically significant difference from 1973 (for proficiencies) or 1978 (for percentages), as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons. The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

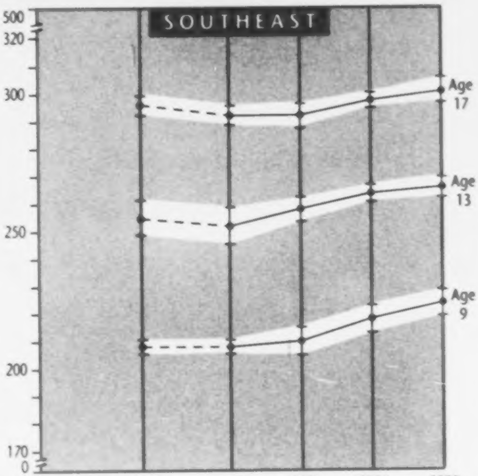
TRENDS IN MATHEMATICS PROFICIENCY FROM 1973 TO 1990 BY REGION

FIGURE 4.4 shows the trends for each of the four geographic regions defined in the NAEP assessments. The increased performance of 9-year-olds in 1990 is readily apparent in each of the four regions. In the Southeast and Central regions, increases were noted since 1982, but in the Northeast and West, the majority of the improvement was between 1986 and 1990. At age 13, students in the Southeast and West showed improvement compared to their average performance in the assessments conducted in the 1970s, but in the Northeast and Central regions, performance has remained relatively constant from assessment to assessment. At age 17, the national pattern of decline in the 1970s followed by recovery during the 1980s was observed in three of the four regions. However, in the Northeast, student

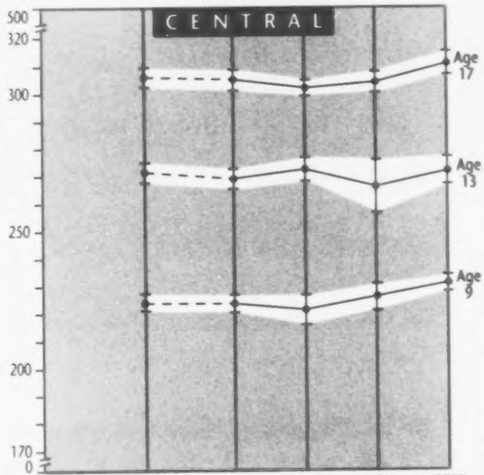
FIGURE 4.4
Trends in Average Mathematics Proficiency by Region, 1973 to 1990



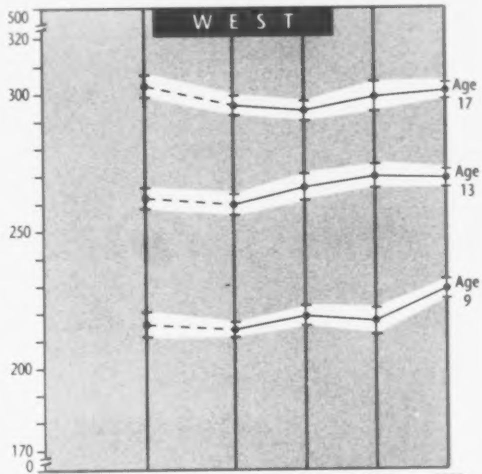
	1973	1978	1982	1986	1990
Age 17	312(1.8)	307(1.8)	304(2.0)	307(1.9)	304(2.1)
	—	23(2.0)	24(2.8)	24(0.8)	22(1.0)
Age 13	275(2.4)	273(2.4)	277(2.0)	277(2.2)	275(2.3)
	—	23(2.2)	24(2.5)	22(1.6)	24(1.0)
Age 9	227(1.9)*	227(1.9)*	226(1.8)*	226(2.7)*	236(2.1)†
	—	23(2.5)	21(2.7)	21(1.1)	23(0.9)



	1973	1978	1982	1986	1990
Age 17	296(1.8)	292(1.7)*	292(2.1)	297(1.4)	301(2.3)
	—	22(2.1)	21(2.1)	23(2.3)	24(0.9)
Age 13	255(3.2)	252(3.3)*	258(2.2)	264(1.4)	266(1.9)
	—	23(2.0)	23(2.1)	25(5.8)	23(0.8)
Age 9	208(1.3)*	208(1.2)*	210(2.5)*	218(2.5)†	224(2.4)†
	—	24(2.1)	24(2.7)	23(4.7)	24(0.9)



	1973	1978	1982	1986	1990
Age 17	306(1.8)	305(1.9)	302(1.4)*	304(1.9)	311(2.1)
	—	31(2.1)	30(4.3)	28(2.2)	26(0.9)
Age 13	271(1.8)	269(1.8)	273(2.1)	266(4.5)	272(2.4)
	—	31(1.8)*	27(3.4)	25(5.0)	24(0.7)†
Age 9	224(1.5)*	224(1.5)*	221(2.7)*	226(2.3)	231(1.3)†
	—	31(1.8)*	28(3.8)	29(4.0)	24(0.6)†



	1973	1978	1982	1986	1990
Age 17	303(2.0)	296(1.8)	294(1.9)*†	299(2.7)	302(1.5)
	—	23(2.5)	26(2.8)	26(0.9)	28(0.9)
Age 13	262(1.9)*	260(1.9)*	266(2.4)	270(2.1)†	269(1.6)†
	—	24(2.2)	27(2.3)	28(1.5)	29(0.9)
Age 9	216(2.2)*	214(1.3)*	219(1.8)*	217(2.4)*	229(1.8)†
	—	23(2.0)	27(2.0)	28(1.6)	28(0.8)

Note: Average proficiencies are in **bold face** type. For each age, the second row of data lists the percentages of students in the total population from each subgroup. Unavailable data are shown by dashes (—).

⌶ 95 percent confidence interval. [- - -] Extrapolated from previous NAEP analyses.

* Statistically significant difference from 1990 and † statistically significant difference from 1973 (for proficiencies) or 1978 (for percentages), as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons. The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

7..

performance at age 17 did not improve significantly during the 1980s as it did in the other three regions.

TRENDS IN MATHEMATICS PROFICIENCY FROM 1978 TO 1990 BY TYPE OF COMMUNITY

TABLE 4.1 presents trends in mathematics proficiency for students attending schools in three extreme community types — advantaged urban, disadvantaged urban, and extreme rural — as well as for students attending schools in other types of communities. These data are available for the assess-

TABLE 4.1

Trends in Average Mathematics Proficiency by Type of Community, 1978 to 1990

		AGE 9		AGE 13		AGE 17	
	Year	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**
Advantaged Urban	1990	12 (2.2)	244 (1.8)	10 (1.9)	283 (2.4)	11 (1.7)	317 (4.4)
	1986	17 (3.1)	239 (2.7)	12 (3.5)	286 (0.9)	13 (2.5)	317 (3.4)
	1982	10 (2.3)	239 (2.2)	9 (2.2)	291 (1.5)*†	10 (1.5)	318 (2.7)
	1978	12 (2.2)	237 (1.8)	9 (1.9)	285 (1.6)	10 (2.1)	321 (2.0)
Disadvantaged Urban	1990	9 (2.5)	214 (4.6)†	11 (2.0)	253 (2.9)†	9 (2.0)	285 (4.2)†
	1986	6 (1.6)	204 (1.9)	9 (4.3)	248 (3.0)†	6 (1.1)	273 (2.0)*
	1982	7 (1.5)	199 (2.2)*	7 (1.5)	246 (4.4)	7 (1.7)	278 (2.4)
	1978	7 (1.2)	199 (2.9)*	7 (1.2)	233 (4.2)*	7 (1.2)	273 (1.7)*
Extreme Rural	1990	8 (1.6)	231 (3.2)†	10 (2.4)	265 (3.7)	12 (1.7)	304 (1.8)†
	1986	5 (2.2)	219 (7.0)	6 (3.5)	270 (6.9)	3 (1.2)*†	305 (5.2)
	1982	11 (3.5)	211 (2.6)*	9 (1.5)	258 (1.9)	8 (1.5)	293 (2.0)*
	1978	8 (1.5)	212 (2.9)*	10 (1.9)	255 (3.4)	8 (1.3)	295 (1.5)*
Other	1990	72 (4.0)	229 (0.9)†	70 (3.4)	272 (1.1)†	69 (3.1)	306 (1.1)†
	1986	73 (4.1)	219 (1.3)*	74 (6.3)	269 (1.1)	78 (3.5)	302 (1.1)
	1982	72 (3.9)	219 (0.9)*	75 (3.0)	269 (1.0)	75 (2.9)	299 (1.0)*
	1978	73 (1.5)	218 (0.7)*	74 (2.9)	266 (1.2)*	75 (3.0)	301 (1.1)*

* Statistically significant difference from 1990 and † statistically different from 1978, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 5 comparisons (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

ments conducted from 1978 through 1990. Although some apparent progress (not statistically significant) was made by 9-year-olds in advantaged urban schools, between 1978 and 1990 average mathematics proficiency for 13- and 17-year-olds was relatively stable across assessments. In contrast, the average proficiency of students attending schools in disadvantaged urban communities increased significantly between 1978 and 1990 at all three ages.

Students attending schools in extreme rural areas also showed progress during the same 12-year period at all three ages, although the increase at age 13 was not statistically significant. Finally, in community types designated as "other," students at all three ages showed significant gains between 1978 and 1990. In each assessment at each age, students in advantaged urban schools had significantly higher average proficiency than did their counterparts in disadvantaged urban schools. Students from extreme rural areas and those in other community types performed similarly, with proficiency levels registering between those of the two urban groups. Although these relative standings did not change across assessments, the substantial performance gap between advantaged and disadvantaged urban students narrowed somewhat, particularly at age 17.

TRENDS IN MATHEMATICS PROFICIENCY FROM 1978 TO 1990 BY PARENTS' HIGHEST LEVEL OF EDUCATION

The trends in average mathematics proficiency by the highest level of education reported for either parent are summarized in TABLE 4.2. Nine-year-olds showed significant progress from 1978 to 1990 across all levels of parental education, except for those in the some education after high school category. At age 13, results were relatively stable across assessments, although a significant increase in proficiency between 1978 and 1990 was noted for 13-year-olds whose parents had not graduated from high school. Between 1978 and 1990, the average proficiency of in-school 17-year-olds did not change significantly for any of the parental education categories. Generally, in each of the four assessments, students with more highly educated parents had higher average proficiency levels.

TABLE 4.2

Trends in Average Mathematics Proficiency by Parents' Highest Level of Education, 1978 to 1990

Level of Education	Year	AGE 9 Percent of Students	AGE 9 Average Proficiency	AGE 13 Percent of Students	AGE 13 Average Proficiency	AGE 17 Percent of Students	AGE 17 Average Proficiency
Did Not Finish High School	1990	5 (0.4)†	210 (2.3)†	8 (0.5)†	253 (1.8)†	8 (0.6)†	285 (2.2)
	1986	4 (0.4)†	201 (2.5)*	8 (1.0)†	252 (2.3)†	8 (0.4)†	279 (2.3)
	1982	8 (0.7)*	199 (1.7)*	11 (0.6)*	251 (1.4)†	14 (0.9)*	279 (1.0)
	1978	8 (0.4)*	200 (1.5)*	12 (0.6)*	245 (1.2)*	13 (0.6)*	280 (1.2)
Graduated High School	1990	16 (0.7)†	226 (1.2)†	27 (0.8)†	263 (1.2)	26 (1.1)†	294 (0.9)
	1986	16 (0.7)†	218 (1.6)*	31 (1.2)	263 (1.2)	28 (1.1)†	293 (1.0)
	1982	25 (0.8)*	218 (1.1)*	34 (0.8)*	263 (0.8)	33 (0.8)*	293 (0.8)
	1978	23 (0.8)*	219 (1.1)*	33 (0.8)*	263 (1.0)	33 (0.7)*	294 (0.8)
Some Education After High School	1990	7 (0.4)	236 (2.0)	17 (0.6)†	277 (1.0)	24 (0.9)†	308 (1.0)
	1986	7 (0.6)†	229 (2.1)	15 (0.6)	274 (0.8)	24 (1.0)†	305 (1.2)
	1982	9 (0.4)*	225 (2.1)*	14 (0.4)*	275 (0.9)	18 (0.5)*	304 (0.9)*
	1978	9 (0.4)	230 (1.7)	14 (0.4)*	273 (1.2)	16 (0.7)*	305 (0.9)
Graduated College	1990	40 (1.1)†	238 (1.3)†	41 (1.2)†	280 (1.0)	39 (1.3)†	316 (1.3)
	1986	38 (1.1)†	231 (1.1)*	37 (2.2)†	280 (1.4)	37 (1.2)	314 (1.4)
	1982	30 (1.5)*†	229 (1.5)*	32 (1.3)*†	282 (1.5)	32 (1.3)*	312 (1.0)†
	1978	24 (1.1)†	231 (1.1)*	26 (1.2)*	284 (1.2)	32 (1.1)*	317 (1.0)

* Statistically significant difference from 1990 and † statistically significant difference from 1978, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 5 comparisons. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students do not total 100 percent because about one-third of the students at age 9 and smaller percentages at ages 13 and 17 reported that they did not know the education level of either parent.

TRENDS IN MATHEMATICS PROFICIENCY FROM 1978 TO 1990 BY TYPE OF SCHOOL

TABLE 4.3 presents trends in average achievement for students attending public schools compared to those attending private schools. However, the sample sizes are small for private schools, consequently, interpretations of the data warrant caution. Students attending public schools showed significant improvement between 1978 and 1990 at all three ages. In comparison, performance by private-school students was more stable across the 12 years. This differential rate of improvement slightly reduced the performance gap between public- and private-school students, although in 1990 those students attending private schools had higher average mathematics proficiency at all three ages.

TABLE 4.3

Trends in Average Mathematics Proficiency by Type of School, 1978 to 1990

	Year	AGE 9		AGE 13		AGE 17	
		Percent of Students	**Average Proficiency**	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**
Public School	1990	89 (2.1)	229 (0.9)	90 (1.4)	269 (1.0)	93 (1.8)	304 (0.8)
	1986	84 (2.7)	220 (1.2)*	96 (1.8)	269 (1.2)	96 (1.4)	301 (1.0)
	1982	87 (2.2)	217 (1.1)*	89 (1.3)	267 (1.3)	92 (1.6)	297 (0.9)*
	1978	89 (1.8)	217 (0.8)*	91 (1.6)	263 (1.2)*	94 (1.0)	300 (1.0)*
Private School	1990	11 (2.1)	238 (2.3)	10 (1.4)	280 (1.7)	7 (1.8)	318 (6.6)
	1986	16 (2.7)	230 (2.5)	4 (1.8)	276 (4.9)	4 (1.4)	320 (9.8)
	1982	14 (2.2)	232 (2.1)	11 (1.3)	281 (2.1)	8 (1.6)	311 (1.7)
	1978	11 (1.8)	231 (1.7)*	9 (1.6)	279 (1.4)	6 (1.0)	314 (3.2)

* Statistically significant difference from 1990 and † statistically significant difference from 1978, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 5 comparisons. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

TRENDS IN MATHEMATICS PROFICIENCY FROM 1978 TO 1990 BY QUARTILES

TABLE 4.4 presents average proficiency for the top 25 percent of the students, the lowest 25 percent of the students, and the middle 50 percent of the students. The results illustrate the tremendous range of performance within each age in each assessment. They also provide information about whether the gains in average mathematics proficiency noted for the nation are occurring for students across the performance distribution.

At age 9, significant gains were noted for students across the entire performance distribution. The lower-performing 25 percent, the middle 50 percent, and the upper-performing 25 percent all showed similar increases in average proficiency between 1978 and 1990. At age 13, the significant improvement between 1978 and 1990 evident for the lower-performing students and those in the middle range was not accompanied by similar gains for the top 25 percent of the students. However, substantial progress was shown by students in the lower quartile at all three ages. At age 17, students in each portion of the performance distribution had significantly higher average proficiency in 1990 than they did in 1978. The gains were smaller for the better performing students, but they also were

TABLE 4.4

Trends in Average Mathematics Proficiency by Quartiles, 1978 to 1990

	Year	AVERAGE PROFICIENCY		
		Age 9	Age 13	Age 17
Upper Quartile	1990	266 (0.8)†	307 (0.6)	341 (0.8)†
	1986	259 (0.7)*†	306 (0.7)	340 (0.7)
	1982	256 (0.6)*	306 (0.7)	336 (0.6)*†
	1978	256 (0.8)*	305 (0.6)	339 (0.4)*
Middle Two Quartiles	1990	231 (0.4)†	271 (0.4)†	305 (0.5)†
	1986	223 (0.5)*†	269 (0.5)*†	301 (0.5)*
	1982	221 (0.5)*	269 (0.3)*†	299 (0.3)*†
	1978	221 (0.5)*	266 (0.4)*	302 (0.3)*
Lower Quartile	1990	190 (1.0)†	234 (0.8)†	268 (0.9)†
	1986	181 (0.7)*†	233 (0.7)†	265 (0.9)†
	1982	179 (0.8)*	230 (0.8)*†	260 (0.7)*
	1978	178 (0.6)*	221 (0.7)*	260 (0.5)*

* Statistically significant difference from 1990 and † statistically significant difference from 1978, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 5 comparisons. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

statistically significant. In sum, progress between 1978 and 1990 was noted across the performance distributions at all three ages, with the exception of the upper quartile of 13-year-olds.

SUMMARY The trends in students' average mathematics proficiency reveal that progress has been made at ages 9 and 13 since NAEP conducted its first mathematics assessment in 1973. After relatively consistent performance between 1973 and 1986, 9-year-olds showed significant improvement in the 1990 assessment. Thirteen-year-olds also had significantly higher mathematics proficiency in 1990 than in 1973, although the changes have been more gradual. At age 17, for students attending school, performance declined during the 1970s, but returned to its original level during the 1980s.

The increases in average proficiency were particularly pronounced at age 9, and across the three ages for students in historically lower-performing groups or in the lower-performing 25 percent. Yet the national improvement can be attributed to some gains made by students from both genders, diverse racial/ethnic groups, and different home and school situations.

For example, Black students made significant progress at all three ages, Hispanic students improved significantly at ages 9 and 13, and White students improved at age 9. Both male and female students showed significant gains at age 9, as did male 13-year-olds. Although 9-year-olds in all four regions of the country had significantly higher average proficiency in 1990 than in 1973, as did 13-year-olds in the West, performance showed little change within regions at the older ages.

Trends in average proficiency across the assessments conducted between 1978 and 1990 by community type, level of parents' education, type of school, and quartile look particularly encouraging, because they do not reflect the declines observed during the 1970s at age 17. These analyses were not possible prior to 1978. Although average proficiency was relatively stable for students attending schools in advantaged urban communities, significant gains were made between 1978 and 1990 by students attending schools in disadvantaged urban communities at all three ages. Similar improvements were made by students in extreme rural areas. Public-school students also showed significant improvement at all three ages. In fact, between 1978 and 1990, significant increases were noted across the distribution of performance at all three ages, with the exception of the upper quartile at age 13.

Because significantly improved performance for 9-year-olds was evidenced in nearly every subpopulation reported by NAEP, improvement at age 13 was sprinkled across subpopulations, and considerable stability was shown at age 17, the trends across time in mathematics proficiency resulted in little change in the relative standings for particular subgroups. The slight performance gap noted between males and females at age 17 narrowed between 1973 and 1990 to where performance between the genders was quite similar at all three ages. In contrast, although Black and Hispanic students closed the gap with their White counterparts, as did disadvantaged urban students with their advantaged urban counterparts, in 1990 these performance differences remained quite large for students at all three ages. In recent assessments, progress toward reducing differences in average proficiency between White students and those in Black and Hispanic minority groups seems for the most part to have stalled.

CHAPTER FIVE

TRENDS IN LEVELS OF MATHEMATICS PROFICIENCY FOR THE NATION AND DEMOGRAPHIC SUBPOPULATIONS

NATIONAL TRENDS IN LEVELS OF MATHEMATICS PROFICIENCY FROM 1978 TO 1990

To provide a context for interpreting the overall mathematics trend results presented in Chapter Four, the NAEP mathematics scale was anchored at five levels—150, 200, 250, 300, and 350.[30] NAEP developed descriptions of performance at these various levels by using the assessment results to delineate sets of questions that students at one level were more likely to answer correctly than were students at the next lower level. The five sets of anchor questions were studied by mathematics educators, who carefully considered and articulated the types of knowledge, skills, and reasoning abilities demonstrated by correct responses. The descriptions summarizing performance at the five levels are found in FIGURE 5.1.

[30] In theory, proficiency levels above 350 or below 150 could have been defined; however, so few students in the assessment performed at the extreme ends of the scale that it was not practical to do so.

FIGURE 5.1
Levels of Mathematics Proficiency

LEVEL 350 MULTI-STEP PROBLEM SOLVING AND ALGEBRA

Students at this level can apply a range of reasoning skills to solve multi-step problems. They can solve routine problems involving fractions and percents, recognize properties of basic geometric figures, and work with exponents and square roots. They can solve a variety of two-step problems using variables, identify equivalent algebraic expressions, and solve linear equations and inequalities. They are developing an understanding of functions and coordinate systems.

LEVEL 300 MODERATELY COMPLEX PROCEDURES AND REASONING

Students at this level are developing an understanding of number systems. They can compute with decimals, simple fractions, and commonly encountered percents. They can identify geometric figures, measure lengths and angles, and calculate areas of rectangles. These students are also able to interpret simple inequalities, evaluate formulas, and solve simple linear equations. They can find averages, make decisions on information drawn from graphs, and use logical reasoning to solve problems. They are developing the skills to operate with signed numbers, exponents, and square roots.

LEVEL 250 NUMERICAL OPERATIONS AND BEGINNING PROBLEM SOLVING

Students at this level have an initial understanding of the four basic operations. They are able to apply whole number addition and subtraction skills to one-step word problems and money situations. In multiplication, they can find the product of a two-digit and a one-digit number. They can also compare information from graphs and charts, and are developing an ability to analyze simple logical relations.

LEVEL 200 BEGINNING SKILLS AND UNDERSTANDINGS

Students at this level have considerable understanding of two-digit numbers. They can add two-digit numbers, but are still developing an ability to regroup in subtraction. They know some basic multiplication and division facts, recognize relations among coins, can read information from charts and graphs, and use simple measurement instruments. They are developing some reasoning skills.

LEVEL 150 SIMPLE ARITHMETIC FACTS

Students at this level know some basic addition and subtraction facts, and most can add two-digit numbers without regrouping. They recognize simple situations in which addition and subtraction apply. They also are developing rudimentary classification skills

The percentages of students at each age attaining the five anchor levels on the NAEP scale provide a way of interpreting what trends in average performance mean in terms of students' understanding of mathematics. TABLE 5.1 shows the percentage of students at ages 9, 13, and 17 who attained each level of proficiency in the 1978, 1982, 1986, and 1990 assessments. (These analyses were not possible for data collected prior to 1978.)

At age 9, nearly all students in the 1990 assessment performed at or above Level 150, which demonstrated facility with simple arithmetic facts. Also, 82 percent demonstrated the beginning mathematics skills and understandings typified by performance at Level 200. This represented a steady and significant increase from the 70 percent perform-

TABLE 5.1

Trends in Percentages of Students at or Above Five Mathematics Proficiency Levels, 1978 to 1990

		ASSESSMENT YEARS			
Proficiency Levels	**Age**	**1978**	**1982**	**1986**	**1990**
Level 350 **Multi-Step Problem Solving and Algebra**	9	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	13	1 (0.2)	1 (0.1)	0 (0.1)	0 (0.1)
	17	7 (0.4)	6 (0.4)	7 (0.5)	7 (0.6)
Level 300 **Moderately Complex Procedures and Reasoning**	9	1 (0.1)	1 (0.1)	1 (0.2)	1 (0.3)
	13	18 (0.7)	17 (0.9)	16 (1.0)	17 (1.0)
	17	52 (1.1)*	49 (1.3)*	52 (1.4)	56 (1.4)
Level 250 **Numerical Operations and Beginning Problem Solving**	9	20 (0.7)*	19 (1.0)*	21 (0.9)*	28 (0.9)
	13	65 (1.2)*	71 (1.2)	73 (1.6)	75 (1.0)
	17	92 (0.5)	93 (0.5)	96 (0.5)	96 (0.5)
Level 200 **Beginning Skills and Understandings**	9	70 (0.9)*	71 (1.2)*	74 (1.2)*	82 (1.0)
	13	95 (0.5)	98 (0.4)	99 (0.2)	99 (0.2)
	17	100 (0.1)	100 (0.0)	100 (0.1)	100 (0.1)
Level 150 **Simple Arithmetic Facts**	9	97 (0.3)	97 (0.3)	98 (0.3)	99 (0.2)
	13	100 (0.1)	100 (0.1)	100 (0.0)	100 (0.0)
	17	100 (0.0)	100 (0.0)	100 (0.0)	100 (0.0)

* Shows statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous mathematics assessments and 1990. (No significance test is reported when the proportion of students is either > 95.0 or < 5.0.) The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the percentage of students is either 0 percent or 100 percent, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent and percentages less than 0.5 percent were rounded to 0 percent.

ing at this level in 1978. Twenty-eight percent of the 9-year-olds performed at or above Level 250, suggesting a grasp of basic operations and beginning problem solving. This represented an improvement from 20 percent at this level in 1978, reflecting a gain primarily during the four-year period from 1986 to 1990. There were no changes across time in performance at the more advanced levels of the scale, with one percent of the students at age 9 performing at Level 300 in each of the four assessments and none at Level 350.

In 1990, virtually all 13-year-olds performed at or above Level 200, and three-fourths performed at or above Level 250. While the high percentage attaining Level 200 has been constant across the mathematics assessments, the 75 percent demonstrating a grasp of basic operations and problem solving (Level 250) was a significant increase from the 65 percent performing at this level in 1978. However, similar to the trends at age 9, there was little or no change across time in performance at Levels 300 and 350. In each of the four assessments, fewer than one-fifth of the 13-year-olds performed at or above Level 300 and only a handful at Level 350.

At age 17, similar to previous assessments, almost all students performed at or above Level 250 in 1990. The percentage capable of using moderately complex procedures and reasoning to solve problems (Level 300) increased significantly during the 12-year span, from 52 percent in 1978 to 56 percent in 1990. Yet the percentage attaining Level 350 has remained relatively constant across the four assessments, at approximately 6 to 7 percent.

LEVEL 150: SIMPLE ARITHMETIC FACTS. Students performing at or above Level 150 were able to perform elementary addition and subtraction; however, their ability to apply these simple arithmetic procedures was quite limited. In 1990, as in the three previous assessments conducted since 1978, virtually all students in each of the three age groups performed at or above Level 150.

LEVEL 200: BEGINNING SKILLS AND UNDERSTANDINGS. Students performing at or above Level 200 demonstrated a greater range and depth of basic mathematical skills than did those who reached only Level 150, but were still developing a grasp of multiplication and division and reasoning ability beyond that required by simple numerical computation. Virtually all 13- and 17-year-olds and more than four-fifths of 9-year-olds performed at or above Level 200 in the 1990 assessment. The findings at ages 13 and 17 were consistent with previous assessments. However, at age 9, the results represented dramatic improvement compared to the 1978 performance level, with an increase of from 70 to 82 percent of the students showing an initial understanding of mathematical skills and concepts.

LEVEL 250: NUMERICAL OPERATIONS AND PROBLEM SOLVING. Students performing at or above Level 250 had developed a surface understanding of the four basic operations, and were beginning to acquire more developed reasoning skills. Trends in the percentages of students demonstrating this level of mathematical understanding showed a significant increase at ages 9 and 13. Yet there were considerable differences in 1990 in the percentages of students reaching this level across the age groups. Although the percentage of 9-year-olds demonstrating these basic computation abilities increased from 20 percent in 1978 to 28 percent in 1990, it might be expected that more students at age 9 would have a grasp of skills that are universally taught in elementary schools. Similarly, although 10 percent more 13-year-olds attained this level in 1990 than in 1978 (75 percent compared to 65 percent), that only three-fourths of these students, primarily in seventh and eighth grades, showed a clear understanding of whole-number computation indicates that there is still room for improvement. At age 17, in 1990, almost all 17-year-olds (96 percent) still attending school had gained basic mathematics skills. However, these results do not reflect the achievement of their peers who had dropped out of school.

LEVEL 300: MODERATELY COMPLEX PROCEDURES AND REASONING. Students performing at or above Level 300 demonstrated more sophisticated numerical reasoning, and were able to draw from a wider range of mathematical areas, including algebra and geometry. At age 17, significantly more students performed at this level in 1990 than did in 1978 — 56 percent compared to 52 percent. There was little or no change in performance at ages 9 and 13. The knowledge and problem-solving skills required to answer questions at Level 300 are probably beyond the curriculum encountered by most elementary students and therefore the small percentages of 9-year-olds reaching this level (about 1 percent in each assessment) might be anticipated. However, students are exposed to many of these topics in middle and junior high school. Thus, that only 17 percent of the 13-year-olds performed at or above this level and that no improvement has been noted across the past 12 years provides support for recent calls for reform in the middle grades.[31]

LEVEL 350: MULTI-STEP PROBLEM SOLVING AND ALGEBRA. Students performing at Level 350 demonstrated the capacity to apply mathematical operations in a variety of problem settings. Yet virtually no 13-year-olds and only 7 percent of the 17-year-olds attending school attained this level, and these results have remained essentially constant since 1978. Repeatedly, the message is set forth that mastery of the basics, including reading, writing, and arithmetic, is not sufficient to achieve success in higher education or career advancement.[32] However, entering the 1990s, no more students than in prior assessments appeared to be gaining the ability to perform more advanced mathematical operations. This inability of students to gain higher-level understandings by the time they graduate from high school translates into increasing numbers of college students enrolled in remedial courses and the need for business to devote considerable resources to training.[33]

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[31] *Turning Points: Preparing American Youth for the 21st Century* (Washington, DC: Carnegie Council on Adolescent Development, Carnegie Corporation of New York, 1989).

Curriculum and Evaluation Standards for School Mathematics (Reston, VA: National Council of Teachers of Mathematics, 1989).

[32] *Workforce 2000: Work and Workers for the 21st Century* (Indianapolis, IN: Hudson Institute, 1987).

[33] *Moving Beyond Myths: Revitalizing Undergraduate Mathematics* (Washington, DC: National Research Council, 1991).

The Business Roundtable Participation Guide: A Primer for Business on Education (New York, NY: National Alliance of Business, 1990).

TRENDS IN LEVELS OF MATHEMATICS PROFICIENCY FROM 1978 TO 1990 BY RACE/ETHNICITY As presented in TABLE 5.2, essentially all students at all three ages performed at or above Level 150 in the 1990 assessment and there was little if any variation in this finding across racial/ethnic groups.[14]

TABLE 5.2

Trends in Percentages of Students at or Above Five Mathematics Proficiency Levels by Race/Ethnicity, 1978 to 1990

		ASSESSMENT YEARS					
		1978			1990		
Proficiency Levels	**Age**	**White**	**Black**	**Hispanic**	**White**	**Black**	**Hispanic**
Level 350							
Multi-Step Problem Solving and Algebra	9	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	13	1 (0.2)	0 (0.1)	0 (0.1)	0 (0.2)	0 (0.3)	0 (0.1)
	17	9 (0.5)	1 (0.2)	1 (0.6)	8 (0.7)	2 (1.0)	2 (0.8)
Level 300							
Moderately Complex Procedures and Reasoning	9	1 (0.2)	0 (0.0)	0 (0.5)	2 (0.4)	0 (0.1)	0 (0.5)
	13	21 (0.7)	2 (0.5)	4 (1.0)	21 (1.2)	4 (1.6)	6 (1.7)
	17	58 (1.1)*	17 (1.6)*	23 (2.7)	63 (1.6)	33 (4.5)	30 (3.1)
Level 250							
Numerical Operations and Beginning Problem Solving	9	23 (0.9)*	4 (0.6)	9 (2.5)	33 (1.0)	9 (1.7)	11 (3.5)
	13	73 (0.9)*	29 (2.1)*	36 (2.9)*	82 (1.0)	49 (3.6)	57 (3.3)
	17	96 (0.3)	71 (1.7)*	78 (2.3)	98 (0.3)	92 (2.2)	86 (4.2)
Level 200							
Beginning Skills and Understandings	9	76 (1.0)*	42 (1.4)*	54 (2.8)*	87 (0.9)	60 (2.8)	68 (3.0)
	13	98 (0.3)	80 (1.5)*	86 (0.9)	99 (0.1)	95 (1.1)	97 (1.1)
	17	100 (0.0)	99 (0.3)	99 (0.4)	100 (0.1)	100 (0.2)	100 (0.7)
Level 150							
Simple Arithmetic Facts	9	98 (0.2)	88 (1.0)	93 (1.2)	100 (0.2)	97 (0.9)	98 (0.8)
	13	100 (0.0)	99 (0.4)	100 (0.3)	100 (0.0)	100 (0.2)	100 (0.3)
	17	100 (0.0)	100 (0.0)	100 (0.0)	100 (0.0)	100 (0.0)	100 (0.0)

* Shows statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous mathematics assessments and 1990. (No significance test is reported when the proportion of students is either > 95.0 or < 5.0.) The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the percentage of students is either 0 percent or 100 percent, the standard error is inestimable. However percentages 99.5 percent and greater were rounded to 100 percent and percentages less than 0.5 percent were rounded to 0 percent. For Asian/Pacific Islander students and American Indian students, the sample sizes were insufficient to permit robust trend estimates.

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[14] Trends in percentages of students performing at each of the five levels in all four mathematics assessments by race/ethnicity and gender are presented in the Data Appendix.

At Level 200, 9-year-olds in all three racial/ethnic groups showed significant progress across the 12-year period from 1978 to 1990, as did Black 13-year-olds. Although White 9-year-olds continued to outperform their Black and Hispanic counterparts in 1990, improvement by 13-year-olds in these minority groups served to close the previously existing performance gap. Whereas almost all of the White 13-year-olds performed at or above Level 200 in 1978, almost all 13-year-olds in all three racial/ethnic groups reached this level of performance in 1990. At age 17, virtually all students across the three racial/ethnic groups performed at or above Level 200 in both 1978 and 1990.

At Level 250, White students showed significant gains during the 12-year period at ages 9 and 13. In 1990, about one-third of White 9-year-olds and four-fifths of White 13-year-olds demonstrated a grasp of basic operations and problem solving. At age 17, almost all White students performed at or above Level 250 in both 1978 and 1990. Black students at ages 13 and 17 showed significant improvement, although fewer than 10 percent of 9-year-olds performed at or above Level 250 in 1990. At age 13, the percentage of Black students performing at or above Level 250 rose dramatically across the 12-year period from 29 to 49 percent. Similarly, 92 percent of Black 17-year-olds performed at this level in 1990 compared to 71 percent in 1978. Although approximately the same percentage of Hispanic 9-year-olds (9 to 11 percent) performed at or above Level 250 in both 1978 and 1990, at age 13 they showed significant progress, from 36 percent in 1978 to 57 percent in 1990. At Level 250, the degree of improvement for Hispanic 17-year-olds was not statistically significant, but the performance gap among the three racial/ethnic groups at age 17 appeared to be diminished in 1990.

In 1990, very few 9-year-olds in any of the three racial/ethnic groups and only about 4 to 6 percent of the Black or Hispanic 13-year-olds performed at or above Level 300. Approximately one-fifth of the White 13-year-olds demonstrated an understanding of moderately complex procedures and reasoning. At ages 9 and 13, these results represented essentially no change from the levels of performance in 1978. In contrast, 17-year-old students in all three racial/ethnic groups showed progress, although the apparent increase in the percentage of Hispanic students performing at or above Level 300 was not statistically significant. Still, in 1990, 63 percent of White students reached this level of performance, compared to 33 percent of Black students and 30 percent of Hispanic students.

Virtually no 9- or 13-year-olds attained Level 350 in either 1978 or 1990. The results at age 17 were also essentially the same in 1990 as in 1978, with about 8 to 9 percent of White 17-year-olds and 1 to 2 percent of Black or Hispanic 17-year-olds reaching Level 350 in each assessment. Thus, virtually all 17-year-olds in all three racial/ethnic groups reached the lower levels of the scale, and there was improvement by all three groups, particularly Black students, at the middle range of the scale. There were few, if any changes at the higher end of the scale. This pattern was consistent for each age group assessed — gains, especially for Black and Hispanic students, were noted at the lower and particularly the mid-portion of the distribution, but not at the high end.

TRENDS IN LEVELS OF MATHEMATICS PROFICIENCY FROM 1978 TO 1990 BY GENDER

TABLE 5.3 shows the percentages of males and females attaining each of the five anchor levels in both 1978 and 1990. In 1978, within each of the three ages assessed, the percentages of males and females reaching the various proficiency levels were remarkably similar, particularly at the three lower levels. Across assessments, generally commensurate increases from 1978 to 1990 for the two gender groups resulted in equivalent attainment for males and females in 1990. Specifically, at age 9, greater percentages of both male and female students performed at or above Level 200 in 1990 than did in 1978. For example, whereas approximately 70 percent of both male and female 9-year-olds attained this level in 1978, 80 percent did in 1990. Similarly, at ages 9 and 13, greater percentages of both males and females performed at or above Level 250. As an illustration, approximately two-thirds of both the male and female 13-year-olds performed at or above this level in 1978 compared to about three-fourths in 1990.

At Levels 300 and 350, the prevailing pattern of few changes in performance at the higher scale levels was evidenced for both genders. Between 1978 and 1990, the only significant gain across the three ages was at Level 300 for female 17-year-olds. However, because males did not show similar improvement at Level 300, the increase by females served to close the gender gap, with from 55 to 58 percent of both groups reaching this level in 1990. In 1990, 6 percent of females and 9 percent of males attained Level 350.

TABLE 5.3

Trends in Percentages of Students at or Above Five Mathematics Proficiency Levels by Gender, 1978 to 1990

		ASSESSMENT YEARS			
		1978		1990	
Proficiency Levels	Age	Male	Female	Male	Female
Level 350					
Multi-Step Problem Solving and Algebra	9	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	13	1 (0.2)	1 (0.2)	1 (0.2)	0 (0.1)
	17	10 (0.6)	5 (0.7)	9 (0.8)	6 (0.8)
Level 300					
Moderately Complex Procedures and Reasoning	9	1 (0.2)	1 (0.2)	1 (0.4)	1 (0.3)
	13	18 (0.9)	18 (0.7)	19 (1.2)	16 (1.0)
	17	55 (1.2)	48 (1.3)*	58 (1.4)	55 (1.8)
Level 250					
Numerical Operations and Beginning Problem Solving	9	19 (0.6)*	20 (1.0)*	28 (1.0)	28 (1.3)
	13	64 (1.3)*	66 (1.2)*	75 (1.8)	74 (1.3)
	17	93 (0.5)	91 (0.6)	96 (0.8)	96 (0.8)
Level 200					
Beginning Skills and Understandings	9	69 (1.0)*	72 (1.1)*	81 (1.0)	82 (1.3)
	13	94 (0.5)	95 (0.5)	98 (0.3)	99 (0.2)
	17	100 (0.1)	100 (0.1)	100 (0.1)	100 (0.1)
Level 150					
Simple Arithmetic Facts	9	96 (0.5)	97 (0.3)	99 (0.3)	99 (0.3)
	13	100 (0.1)	100 (0.1)	100 (0.0)	100 (0.0)
	17	100 (0.0)	100 (0.0)	100 (0.0)	100 (0.0)

* Shows statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of three comparisons between previous mathematics assessments and 1990. (No significance test is reported when the proportion of students is either > 95.0 or < 5.0.) The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the percentage of students is either 0 percent or 100 percent, the standard error is inestimable. However percentages 99.5 percent and greater were rounded to 100 percent and percentages less than 0.5 percent were rounded to 0 percent.

SUMMARY At age 9, virtually all students performed at or above Level 150 in all four assessments — 1978, 1982, 1986, and 1990. In addition, significantly greater percentages of 9-year-olds performed at or above both Levels 200 and 250 in 1990 than in previous assessments, indicating that more elementary students are developing basic mathematics skills and understandings. For example, in 1990, 82 percent performed at or above Level 200 compared with 70 to 74 percent in previous assessments and 28 percent performed at or above Level 250 compared with 19 to 21 percent in prior assessments.

In general, these improvements for 9-year-olds were noted across all three racial/ethnic groups and for both males and females, with both the levels of mathematics proficiency and improvement in that understanding being very similar for males and females. In contrast, although some closing of the performance gap was noted between White 9-year-olds and their Black or Hispanic counterparts, substantial differences still remained in 1990.

In 1990, nearly all 13-year-olds demonstrated a grasp of beginning skills and understandings (Level 200), which represented progress for both Black and Hispanic students. Thirteen-year-olds as a whole made significant gains at Level 250, with three-fourths performing at or above this level in 1990 compared to 65 percent in 1978. Improvement at Level 250 (typified by a grasp of the four basic operations and beginning problem-solving skills) was posted by all three racial/ethnic groups and by both genders. On the other hand, whereas males and females performed similarly in 1990, there was considerable difference in performance between White 13-year-olds and their Black and Hispanic counterparts. For example, in 1990, 82 percent of White 13-year-olds performed at or above Level 250 compared to 49 percent of Black students and 57 percent of Hispanic students.

At age 13, the national results at Levels 300 and 350 were essentially constant across the four assessments, with approximately 16 to 18 percent of the students performing at or above Level 300 and virtually no students attaining Level 350. At the higher scale levels, consistency in results across assessments also held for 13-year-olds by gender and race/ethnicity. However, although both males and females performed similarly in each assessment, a greater percentage of White than Black and Hispanic 13-year-olds reached Level 300.

Nearly all 17-year-olds reached or surpassed Level 200 in each assessment during the 12-year period from 1978 to 1990. In 1990, almost all (96 percent) also performed at or above Level 250. Significantly more 17-year-olds performed at or above Level 300 than in earlier assessments. In 1990, 56 percent demonstrated a grasp of moderately complex procedures and reasoning, compared to 52 percent in 1978. There was no improvement at Level 350, however, with approximately 6 to 7 percent of 17-year-olds attaining this level in each assessment.

Significant improvement at Level 300 was made by female 17-year-olds, which served to close the gender performance gap. Black and Hispanic 17-year-olds also made gains at both Levels 250 and 300, although the apparent gains by Hispanic students were not statistically significant. Although almost all White 17-year-olds performed at or above Level 250 across the assessments, they too showed significant improvement at Level 300.

Few changes across the assessments were noted at Level 350 in performance by gender or race/ethnicity.

Taken together, these results are encouraging from a number of perspectives. First, virtually all students are gaining basic mathematics understandings, a result that has been maintained and even improved slightly across the assessments. Second, students at all three ages showed significant increases in the percentages reaching the middle levels on the scale. That significantly more 17-year-olds in 1990 demonstrated a grasp of moderately complex materials serves to illustrate the fact that our nation appears to be raising both the floor and, to some extent, the ceiling of its proficiency in mathematics. Third, this phenomenon is most clearly evident in the trend results for Black and Hispanic students, where 9-year-olds made substantial gains at Level 200, and 13-year-olds made substantial gains at Level 250. Also, more Black 17-year-olds reached Levels 250 and 300. In several instances, the advances brought minority-group students up to a performance level equivalent to that of their White counterparts. Finally, the trends by gender show systematic and generally equivalent rates of progress for both males and females, with females tending to close the slight gender gap that had existed at age 17 at the higher scale levels.

Concerns about the findings reside in the low percentages of students attaining higher levels of proficiency, and in the fact that the trends across time suggest no change in the percentage of students learning more advanced material. For example, in 1990, fewer than one-fifth of the 13-year-olds demonstrated success with mathematics tasks involving moderately complex procedures, and only 7 percent of 17-year-olds demonstrated facility with multi-step problem solving and aspects of algebra. Also, despite the considerable gains by Black and Hispanic students, and some modest gains by White students, the performance gap is still large between White students and their Black and Hispanic counterparts of the same age.

CHAPTER SIX

PATTERNS AND TRENDS IN SCHOOL AND HOME CONTEXTS FOR LEARNING MATHEMATICS

TRENDS IN CLASSROOM INSTRUCTION AT AGE 17 FROM 1978 TO 1990

The calls for reform in school mathematics center on curriculum revision and changing the nature of the learning environment in the nation's classrooms.[35] If students are to learn mathematics in a way that will promote its use in their lives, they need to focus on developing problem-solving and logical-reasoning skills, learning to communicate mathematically, and making connections between the mathematics they study and its applications in other disciplines and activities. These new learning environments are characterized by student involvement in classroom activities, use of manipulative materials, and discussions about patterns and alternative ways to solve problems.

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[35] *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

Professional Standards for Teaching Mathematics (Reston, VA: National Council of Teachers of Mathematics, 1991).

Reshaping School Mathematics: A Philosophy and Framework for Curriculum (Washington, DC: Mathematical Sciences Education Board and National Research Council, National Academy Press, 1990).

Everybody Counts: A Report to the Nation on the Future of Mathematics Education, Lynn Steen, editor (Washington, DC: National Research Council, National Academy Press, 1989).

The NAEP trend results provide a picture of the percentage of 17-year-olds who were involved in various classroom activities in 1978 compared to 1990. These activities include several in which students might be more actively engaged in mathematics learning, for example, participating in discussions and making reports or projects. They also cover more passive activities, such as listening to the teacher and watching him or her do problems on the board. The results are presented in TABLE 6.1.

In general, students tended to report more participation in these activities in 1990 than they did in 1978. For discussing mathematics, watching the teacher work problems on the board, and taking tests, there were significant increases in the percentages of students reporting "often" that seemed to result from complementary decreases in those reporting they only participated in these activities "sometimes." The relatively small percentages of students reporting they never engaged in these activities showed little change between 1978 and 1990. One of the remaining activities — listening to the teacher — also followed this same pattern, although to a lesser degree.

The one decrease reported by 17-year-olds was in the amount of boardwork they did. The shift was from the "sometimes" to the "never" category, which may reflect changes in instructional strategies toward more use of technology or group-oriented activities.

The stability in students' reports about the frequency with which they did reports or projects, however, as well as the low degree of participation in these activities, are not consistent with recommendations for reform in school mathematics. In both assessments, about three-fourths of the 17-year-olds reported never having done these types of activities. If students are going to learn to communicate their understandings and be able to build their own models of mathematical concepts, they need to be able to write reports and carry out the constructive tasks that go into completing a project.[36]

In 1990, activities generally considered more student centered remained far less prevalent than listening to teacher explanations, watching the teacher work problems, or taking tests. More than four-fifths of the 17-year-olds reported frequent participation in these activities, compared to 63 percent for discussing mathematics, 28 percent for doing their own boardwork, and 5 percent for doing reports or projects.

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[36] *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

Thomas A. Romberg and Thomas P. Carpenter, "Research on Teaching and Learning Mathematics: Two Disciplines of Scientific Inquiry" in *Handbook of Research on Teaching* (Third Edition), M.C. Wittrock, editor (New York, NY: Macmillan, 1986).

Magdalene Lampert, "Connecting Mathematical Teaching and Learning" in *Integrating Research on Teaching and Learning Mathematics* (Madison, WI: National Center for Research in Mathematics Science Education, 1988).

TABLE 6.1

Trends in Mathematics Classroom Activities at Age 17, 1978 to 1990

In your high school mathematics courses, how often did you . . .	OFTEN		SOMETIMES		NEVER	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Listen to a teacher explain a mathematics lesson?						
1990	84 (1.3)	308 (1.8)	13 (1.0)	293 (2.3)	3 (0.6)	284 (4.4)
1978	79 (1.2)	304 (1.5)	19 (1.1)*	294 (3.2)	2 (0.4)	282 (6.0)
Discuss mathematics in class?						
1990	63 (1.5)	309 (2.0)	31 (1.4)	302 (1.7)	7 (0.6)	291 (3.2)
1978	51 (1.5)*	306 (1.8)	43 (1.4)*	298 (1.8)	7 (0.6)	289 (4.0)
Watch the teacher work mathematics problems on the board?						
1990	85 (1.3)	309 (1.8)	12 (1.0)	291 (2.4)	3 (0.5)	279 (4.9)
1978	80 (1.1)*	304 (1.5)	18 (0.9)*	292 (2.9)	2 (0.4)	282 (5.2)
Work mathematics problems on the board?						
1990	28 (1.7)	307 (2.5)	52 (1.4)	307 (2.0)	21 (1.1)	301 (2.1)
1978	28 (1.3)	303 (1.9)	60 (1.2)*	302 (1.8)	12 (1.1)*	293 (3.9)
Make reports or do projects on mathematics?						
1990	5 (1.1)	306 (12.9)	23 (1.5)	308 (3.0)	72 (2.1)	305 (1.4)
1978	2 (0.2)	286 (8.3)	23 (1.2)	300 (2.5)	75 (1.3)	302 (1.5)
Take mathematics tests?						
1990	84 (1.0)	308 (1.7)	14 (0.8)	298 (2.9)	2 (0.4)	268 (7.8)
1978	64 (1.3)*	308 (1.7)	33 (1.1)*	292 (2.1)	3 (0.5)	270 (4.7)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous mathematics assessments and 1990. The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

The relationships between average proficiency and the degree of participation in the various activities did not tend to change from assessment to assessment. In both 1978 and 1990, more frequent student participation tended to be associated with higher average proficiency, except for making reports and projects, where this positive relationship was not noted.

Trends in 17-year-olds' responses to a question about their level of understanding in mathematics class also were not particularly supportive of progress in school mathematics reform. These data, shown in TABLE 6.2, reflect only slight progress, if any, across the 1980s in improving students' feelings about their grasp of the content of class discussions.

TABLE 6.2

Trends in Percentages of Students Understanding Their Mathematics Class Discussion at Age 17, 1978 to 1990

		STRONGLY AGREE OR AGREE		UNDECIDED, STRONGLY DISAGREE OR DISAGREE	
I usually understand what we are talking about in mathematics.		**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**
Age 17	1990	71 (1.2)	307 (1.5)	29 (1.2)	295 (1.9)
	1978	67 (1.1)	303 (1.8)	33 (1.1)	290 (2.1)
White	1990	73 (1.2)	312 (1.3)	27 (1.2)	302 (1.9)
	1978	67 (1.4)	309 (1.7)	33 (1.4)	294 (2.1)
Black	1990	67 (3.6)	289 (4.9)	33 (3.6)	285 (3.8)
	1978	72 (2.4)	267 (2.9)*	28 (2.4)	257 (3.9)*
Hispanic	1990	63 (3.8)	287 (5.9)	37 (3.8)	273 (6.7)
	1978	62 (5.1)	271 (5.5)	39 (5.1)	269 (5.8)
Male	1990	73 (1.9)	309 (1.8)	27 (1.9)	295 (2.5)
	1978	71 (1.5)	307 (2.2)	29 (1.5)	292 (2.8)
Female	1990	70 (1.5)	305 (1.9)	30 (1.5)	296 (2.5)
	1978	64 (1.8)	298 (2.0)	30 (1.8)	288 (2.5)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous mathematics assessments and 1990. The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

In 1990, 71 percent of 17-year-olds strongly agreed or agreed that they understood what was talked about in mathematics class, and these results were similar across students categorized by gender and race/ethnicity. In general, students who reported more understanding tended to have higher proficiency.

TRENDS IN MATHEMATICS COURSE TAKING AT AGE 17 FROM 1978 TO 1990

Initial reform attempts in mathematics to increase high-school graduation requirements have been followed by efforts to modify courses to correspond more directly to student needs and capabilities. For example, the *NCTM Standards* call for all students to study at least three years of mathematics and for college-bound students to complete a fourth year of study. An allied recommendation is that all students will take a mathematics course as part of their senior year.[57]

Results from the Second International Mathematics Study conducted in the 1980s showed that for developed countries, the United States was among the most lax in its secondary-school mathematics requirements.[58] However, the NAEP results presented in TABLE 6.3 indicate that in 1990, higher percentages of 17-year-olds took upper-level mathematics courses, such as Algebra II, than had in 1978.

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[57] *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

[58] Curtis C. McKnight, et.al., *The Underachieving Curriculum: Assessing U.S. School Mathematics from an International Perspective, A National Report on the Second International Mathematics Study* (Champaign, IL: International Association for the Evaluation of Educational Achievement, Stipes Publishing Company, 1987).

TABLE 6.3

Trends in Highest Level of Mathematics Course Taken at Age 17, 1978 to 1990

	NATION	WHITE	BLACK	HISPANIC	MALE	FEMALE
Prealgebra or General Mathematics						
1990 Percent	15 (0.9)	15 (0.9)	16 (2.0)	21 (2.9)	16 (1.2)	14 (0.9)
Proficiency	273 (1.1)	277 (1.1)	264 (2.2)	259 (4.0)	274 (1.7)	271 (1.8)
1978 Percent	20 (1.0)*	18 (1.1)	31 (1.3)*	36 (3.1)*	21 (1.0)*	20 (1.1)*
Proficiency	267 (0.8)*	272 (0.6)*	247 (1.6)*	256 (2.3)	269 (1.0)	265 (0.9)*
Algebra I						
1990 Percent	15 (0.6)	15 (0.6)	16 (1.6)	24 (2.9)	16 (1.0)	15 (0.8)
Proficiency	288 (1.2)	292 (1.6)	278 (4.0)	278 (4.1)	291 (1.6)	285 (1.8)
1978 Percent	17 (0.6)	17 (0.6)	19 (1.2)	19 (2.1)	15 (0.6)	18 (0.7)
Proficiency	286 (0.7)	291 (0.6)	264 (1.5)*	273 (2.8)	289 (0.9)	284 (1.0)
Geometry						
1990 Percent	15 (0.8)	15 (0.8)	17 (2.1)	13 (2.0)	16 (0.9)	14 (0.9)
Proficiency	299 (1.5)	304 (1.3)	285 (3.5)	286 (3.5)	302 (1.6)	296 (1.8)
1978 Percent	16 (0.6)	17 (0.7)	11 (0.8)	12 (1.2)	15 (0.5)	18 (0.8)
Proficiency	307 (0.7)*	310 (0.6)*	281 (1.9)	294 (4.4)	310 (1.0)*	304 (0.8)*
Algebra II						
1990 Percent	44 (1.2)	46 (1.4)	41 (3.2)	32 (3.5)	42 (1.4)	47 (1.8)
Proficiency	319 (1.0)	323 (0.9)	302 (3.2)	306 (3.3)	323 (1.2)	316 (1.1)
1978 Percent	37 (1.2)*	39 (1.3)*	28 (2.1)*	23 (2.5)	38 (1.2)	37 (1.3)*
Proficiency	321 (0.7)	325 (0.6)	292 (1.4)*	303 (2.9)	325 (0.8)	318 (0.9)
Precalculus or Calculus						
1990 Percent	8 (0.8)	8 (0.9)	6 (1.8)	7 (1.7)	8 (1.1)	8 (1.0)
Proficiency	344 (2.6)	347 (2.8)	329 (7.6)	323 (9.6)	347 (2.4)	341 (4.0)
1978 Percent	6 (0.4)	6 (0.4)	4 (0.6)	3 (0.9)	7 (0.5)	4 (0.4)
Proficiency	334 (1.4)*	338 (1.1)*	297 (6.5)*	306 (6.1)	337 (2.0)*	329 (1.8)*

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous mathematics assessments and 1990. The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent because a small percentage of students reported having taken other mathematics courses.

In 1978, 20 percent of 17-year-olds nationally and 18 to 36 percent across racial/ethnic and gender groups reported no mathematics study beyond prealgebra or general mathematics. In 1990, these figures were reduced to 15 percent nationally, and 14 to 21 percent across subgroups by race/ethnicity or gender. The corresponding increases in course work were noted in the percentages of 17-year-olds having taken coursework through the sequence of Algebra I, Geometry, and Algebra II. Thus, in 1990, more students also had taken Algebra I and Geometry as well as Algebra II than had students 12 years earlier. Despite these increases, only about half the 17-year-olds attending school had pursued their mathematics study at least through Algebra II.

In 1990, 17-year-olds who had only taken prealgebra or general mathematics course work had significantly higher average proficiency than their counterparts in 1978. Students who had pursued coursework only through Algebra I displayed no significant changes in average proficiency between 1978 and 1990. However, students who had taken geometry, but had not gone on to Algebra II, showed a significant decrease in achievement. This decline may signal the emergence of a second track of geometry in the mathematics curriculum, since in many schools there is often a course entitled "informal geometry," with content marked by a heavy influence on applications of geometric relations.[39] More emphasis is placed on measurement topics and less on the necessity and practice of proof. The greater accessibility of this course for many students may have influenced the increased percentages of students proceeding past Algebra I and through geometry on to Algebra II. However, average proficiency levels for students having completed course work through Algebra II remained essentially constant between 1978 and 1990.

Finally, only negligible upward shifts, about 8 percent, were found in the percentages of students who reported having taken precalculus or calculus in 1990. However, their average proficiency levels were significantly higher than those of their 1978 counterparts who had taken precalculus or calculus course work. Nevertheless, in 1990 more than 90 percent of the students nationally, as well as by gender or race/ethnicity classification, had opted out of the mathematics pipeline without taking the more advanced courses. As we enter the 1990s, the small percentages of students enrolled in higher-level courses continue to be a matter of concern.[40]

[39] *Illinois Secondary School Course Offerings, 1987: Special Report on Mathematics*. Illinois State Board of Education. Published by them in Springfield, Ill, June 1989.

[40] *Everybody Counts: A Report to the Nation on the Future of Mathematics Education*, Lynn Steen, editor (Washington,DC: National Academy Press, 1989).

Moving Beyond Myths: Revitalizing Undergraduate Mathematics (Washington, DC: National Research Council, National Academy Pres, 1991).

TRENDS IN THE USE OF TECHNOLOGY IN MATHEMATICS CLASSES AT AGES 13 AND 17 FROM 1978 TO 1990

Greater use of technology, including calculators and computers, is consistently stressed among suggestions for more effective mathematics instruction.[41] These devices can enable students to apply many more examples of concepts, allow them to engage in more illustrations of procedures, and generally provide them with expanded avenues for exploration.

Research provides strong evidence of the enabling role calculators can play in supporting traditional mathematics curriculum goals, such as problem solving and communication.[42] The *NCTM Standards* call for the use of calculators across the curriculum from the primary grades forward, and there is the expectation that they will be available for use both in class and during testing settings. To measure progress in students' performance using a calculator, each of NAEP's four mathematics trend assessments conducted from 1978 to 1990 included a small set of calculator items common to each assessment. The results are summarized in TABLE 6.4.

At ages 9 and 13, students' success on questions for which they were permitted use of a calculator increased significantly between 1978 and 1990. Seventeen-year-olds using calculators showed a significant gain in average performance between 1982 and 1990, after an initial decline between 1978 and 1982.

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[41] *Professional Standards for Teaching Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1991).

The Governors' 1991 Report on Education, Results in Education: 1990 (Washington, DC: The National Governors Association, 1990).

Everybody Counts: A Report to the Nation on the Future of Mathematics Education, Lynn Steen. editor (Washington, DC: National Research Council, National Academy Press, 1989).

Reshaping School Mathematics: A Philosophy and Framework for Curriculum (Washington, DC: Mathematical Sciences Education Board and National Research Council, National Academy Press, 1990).

Curriculum and Evaluation Standards for School Mathematics (Reston, VA: National Council of Teachers of Mathematics, 1989).

The National Science Board Commission on Precollege Education in Mathematics, Science, and Technology, *Educating Americans for the 21st Century* (Washington, DC: National Science Foundation, 1983).

[42] Ray Hembree and Donald J. Dessart, "Effects of Hand-Held Calculators in Precollege Mathematics Education: A Meta-Analysis" in *The Journal for Research in Mathematics Education*, 17 (2), March 1986, pp. 83-99.

TABLE 6.4

Trends in Average Percentage Correct Using a Calculator at Ages 9, 13, and 17, 1978 to 1990

	1978	1982	1986	1990
Age 9 (8 items)	74 (1.0)*	75 (0.8)	75 (0.7)	78 (0.9)
Age 13 (8 items)	55 (1.4)*	52 (1.4)*	55 (1.4)*	60 (1.0)
Age 17 (11 items)	63 (1.0)	59 (1.2)*	65 (1.2)	66 (1.0)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous mathematics assessments and 1990. The standard errors of the estimated averages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

Thirteen- and 17-year-olds were also asked a number of questions about the availability and use of computers. Differences in their responses between 1978 and 1990, for the nation as well as for students in the upper and lower quartiles, are shown in TABLE 6.5. During the 12-year period, students reported a substantial increase in the use of computers in mathematics instruction. However, as late as 1990, only about one-half the students reported access to computers to learn mathematics and computer use seemed to be more prevalent for better students than for their lower-performing classmates.

From 1978 to 1990, significant increases in "yes" answers were obtained in response to the question "Do you have access to a computer terminal in your school for learning mathematics?" In 1978, relatively small percentages (12 percent) of 13-year-olds reported such access. More 17-year-olds than 13-year-olds reported access to computers (24 percent), but in contrast to the results at age 13, availability was much more prevalent for upper- than lower-quartile students (42 compared to 13 percent). In 1990, close to half the students at both ages reported that they had access to computers to learn mathematics. However, the difference in access reported by high- and low-performing 17-year-olds persisted (63 compared to 46 percent).

TABLE 6.5

Trends in Availability and Use of Computers at Ages 13 and 17, 1978 to 1990

	PERCENTAGES OF STUDENTS REPORTING "YES"					
	AGE 13			AGE 17		
	Nation	Upper Quartile	Lower Quartile	Nation	Upper Quartile	Lower Quartile
Had Access to Computer to Learn Mathematics						
1990: Percent	44 (2.2)	47 (2.8)	43 (2.8)	55 (2.1)	63 (3.7)	46 (3.3)
Proficiency	273 (1.7)	309 (1.9)	232 (1.5)	310 (2.3)	344 (1.4)	268 (1.0)
1978: Percent	12 (1.8)*	11 (3.1)*	16 (2.2)*	24 (2.7)*	42 (5.0)*	13 (2.2)*
Proficiency	262 (4.1)	304 (3.9)	219 (7.1)	314 (2.9)	344 (2.2)	259 (4.0)
Studied Mathematics through Computer Instruction						
1990: Percent	45 (1.8)	51 (2.4)	45 (3.2)	35 (2.1)	45 (4.3)	33 (3.2)
Proficiency	273 (1.9)	310 (1.4)	233 (1.6)	311 (3.2)	345 (1.9)	269 (1.6)
1978: Percent	14 (0.9)*	16 (2.2)*	14 (1.5)*	12 (1.1)*	19 (3.6)*	9 (1.5)*
Proficiency	267 (3.2)	304 (3.7)	218 (5.8)	309 (4.7)	344 (3.9)	262 (3.8)
Used a Computer to Solve Mathematics Problems						
1990: Percent	69 (1.6)	72 (2.0)	67 (3.5)	65 (1.7)	75 (2.7)	59 (2.5)
Proficiency	273 (1.3)	309 (1.1)	234 (1.2)	309 (2.1)	343 (1.2)	268 (1.0)
1978: Percent	56 (1.4)*	63 (2.9)*	51 (3.0)*	46 (1.5)*	53 (3.8)*	41 (2.4)*
Proficiency	268 (1.8)	303 (1.9)	223 (2.8)*	303 (2.1)	343 (2.1)	262 (1.9)
Taken a Course in Computer Programming						
1990: Percent	Questions not asked at age 13.			33 (1.2)	35 (2.0)	34 (2.2)
Proficiency				307 (1.4)	342 (1.1)	268 (2.2)
1978: Percent				10 (0.9)*	19 (2.1)*	5 (0.5)*
Proficiency				318 (2.0)*	343 (1.3)	263 (1.3)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous mathematics assessments and 1990. The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

In 1978, few 13- or 17-year-olds nationally (12 to 14 percent) reported having studied mathematics through computer instruction. However, the percentages so responding rose significantly in 1990 to 45 and 35 percent at ages 13 and 17, respectively. In 1978, these results did not fluctuate much across performance quartiles at age 13, although there was a tendency for upper-quartile 17-year-olds to report more access than their lower-performing counterparts. In 1990, the pattern indicated more use by better performing students at both ages.

At both ages 13 and 17, the percentage of students having used a computer to solve a mathematical problem increased significantly from about one-half to two-thirds between 1978 and 1990. In both assessments, the patterns were similar for upper- and lower-quartile students, with somewhat more upper-quartile 17-year-olds reporting problem solving using a computer. The percentage of 17-year-olds reporting course work in computer programming also increased significantly in 1990, from 10 to 33 percent. In 1990, students' reports about course work in computer programming did not differ between the most and least proficient students, which represented a closing of the gap since 1978.

TRENDS IN ATTITUDES TOWARD MATHEMATICS AT AGES 13 AND 17 FROM 1978 TO 1990

Because students' comfort in doing mathematics and their attitudes about its value may affect both their desire to study the subject and their success with it, mathematics reform recommendations for the school curriculum include fostering positive attitudes.[43] At ages 13 and 17, a set of questions about students' perception of mathematics have been included across assessments, including four questions about their personal experience with the subject and two about their views of the discipline.

The findings for the 1978 and 1990 assessments presented in TABLE 6.6 indicate that students with more positive attitudes also tended to have higher average proficiency. Although about two-thirds of both 13- and 17-year-olds strongly agreed or agreed that mathematics improves logical thinking skills, fewer than one-half wanted to take more mathematics, and about one-fourth said they were in their current course only because they had to be there.

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[43] *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

H.L. Reyes, "Affective Variables and Mathematics Education," *Elementary School Journal*, 18(2), 1984, pp. 207-218.

Margaret R. Meyer and Mary Schatz Koehler, "Internal Influences on Gender Differences in Mathematics" in *Mathematics and Gender*, Elizabeth Fennema and Gilah C. Leder, editors (New York, NY: Teachers College Press, 1990).

TABLE 6.6

Trends in Attitudes Toward Mathematics at Ages 13 and 17, 1978 to 1990

		STRONGLY AGREE OR AGREE		UNDECIDED, STRONGLY DISAGREE OR DISAGREE	
		Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
I would like to take more mathematics.					
Age 13:	1990	43 (1.3)	273 (1.6)	57 (1.3)	269 (1.4)
	1978	50 (1.5)*	263 (2.6)*	51 (1.5)*	268 (1.4)
Age 17:	1990	37 (1.3)	312 (1.9)	63 (1.3)	299 (1.4)
	1978	39 (1.7)	304 (2.0)	61 (1.7)	295 (1.7)
I am taking mathematics only because I have to.					
Age 13:	1990	28 (1.0)	263 (1.8)	72 (1.0)	274 (1.4)
	1978	29 (1.4)	256 (2.4)	71 (1.4)	270 (1.9)
Age 17:	1990	27 (1.1)	294 (1.9)	73 (1.1)	307 (1.5)
	1978	27 (1.5)	287 (2.5)	73 (1.5)	302 (1.8)
I am good at mathematics.					
Age 13:	1990	71 (1.0)	274 (1.6)	29 (1.0)	263 (1.7)
	1978	65 (1.3)*	270 (2.0)	35 (1.3)*	258 (1.9)
Age 17:	1990	58 (1.7)	311 (1.6)	42 (1.7)	294 (1.8)
	1978	54 (1.5)	307 (2.0)	46 (1.5)	289 (1.5)
Mathematics is more for boys than girls.					
Age 13:	1990	5 (0.5)	261 (3.2)	95 (0.5)	271 (1.3)
	1978	3 (0.3)	247 (6.1)	98 (0.3)	266 (1.7)
Age 17:	1990	4 (0.6)	305 (6.4)	96 (0.6)	305 (1.6)
	1978	2 (0.3)	291 (7.0)	98 (0.3)	299 (1.6)
Mathematics helps a person think logically.					
Age 13:	1990	66 (1.3)	273 (1.6)	34 (1.3)	267 (1.4)
	1978	74 (1.1)*	268 (1.9)	26 (1.1)*	261 (2.4)
Age 17:	1990	71 (1.2)	308 (1.4)	29 (1.2)	294 (1.8)
	1978	77 (1.1)*	301 (1.7)*	23 (1.1)*	289 (2.2)
New discoveries are seldom made in mathematics.					
Age 13:	1990	34 (1.1)	268 (2.0)	66 (1.1)	272 (1.4)
	1978	36 (1.5)	255 (2.2)*	64 (1.5)	272 (1.5)
Age 17:	1990	33 (1.3)	300 (1.7)	67 (1.3)	306 (1.6)
	1978	19 (1.2)*	284 (3.2)*	81 (1.2)*	302 (1.5)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous mathematics assessments and 1990. The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

At age 13, students' affinity for mathematics, as measured by the desire to continue studying it, decreased from 50 percent in 1978 to 43 percent in 1990. No changes occurred during the same period at age 17, but fewer than two-fifths expressed a positive interest in more mathematics course taking. More than one-fourth of the students said they were only taking mathematics only because they had to, and these results were remarkably consistent across ages and assessments.

From 1978 to 1990, students' confidence in their own mathematical ability appeared to increase for both 13- and 17- year-olds, although the change at age 17 was not statistically significant. The percentages in 1990 strongly agreeing or agreeing that they were good in mathematics were 71 and 58 percent at the two ages, respectively. In 1990, very few students at either age (5 percent or less) responded that mathematics is more for boys than girls, and this represented consistency in these feelings across assessments.

For both 13- and 17-year-olds, smaller percentages of students in 1990 than in 1978 tended to strongly agree or agree that mathematics helps a person to think logically. Whereas about three-fourths seemed to view the discipline positively from this perspective in 1978, about 66 percent of 13-year-olds and 71 percent of 17-year-olds had this perception in 1990. In 1990, about one-third of the students at both ages 13 and 17 seemed to believe that new discoveries are seldom made in mathematics. These results represented no change between 1978 and 1990 for 13-year-olds, but a significant increase in the percentage of 17-year-olds viewing mathematics as a less than dynamic discipline.

TRENDS IN TELEVISION WATCHING AT AGES 9, 13, AND 17 FROM 1978 TO 1990

As shown in TABLE 6.7, trends in students' reports about their television watching habits revealed an increase in viewing time across the 1980s at all three ages. The shift tended to be from watching 0 to 2 hours of television per day to watching 3 to 5 hours per day. The percentages watching 6 or more hours of television each day remained relatively constant across assessments, except perhaps at age 17. In 1990 and in prior assessments, 13- and 17-year-olds who reported more television watching tended to have lower average achievement levels. In 1990, the pattern was also evidenced at age 9, where students reporting less than 6 hours of viewing each day had higher proficiency than those who watched for longer periods.

TABLE 6.7

Trends in Television Watching at Ages 9,13, and 17

	NUMBER OF HOURS WATCHED PER DAY					
	0-2 HOURS		3-5 HOURS		6 OR MORE HOURS	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
AGE 9						
1990	37 (0.9)	231 (1.2)	39 (0.7)	234 (0.9)	23 (0.8)	221 (1.4)
1982	44 (1.1)*	218 (1.4)*	29 (0.6)*	227 (1.1)*	26 (1.0)	215 (1.2)*
AGE 13						
1990	31 (0.9)	277 (1.2)	53 (0.7)	271 (0.9)	17 (0.7)	258 (1.4)
1982	45 (0.8)*	273 (1.2)	39 (0.4)*	269 (1.1)	16 (0.8)	256 (1.8)
AGE 17						
1990	51 (1.2)	312 (1.1)	41 (1.1)	300 (1.2)	9 (0.5)	287 (1.8)
1978	69 (0.7)*	305 (1.0)*	26 (0.6)*	296 (1.1)*	5 (0.2)*	279 (2.1)*

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous mathematics assessments and 1990. The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each popula-tion of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding. Data from 1978 are not available at ages 9 and 13.

SUMMARY Prominent among the many recommendations for school mathematics reform and supported by education research into effective learning are the goals of encouraging more active learning by students and using technology to support increasingly sophisticated problem solving. It is also clear that too few high-school students study mathematics. Although none of these concerns was addressed on a widespread basis in 1990, the NAEP results hint that some progress has been made in the direction of these recommendations during the 1980s, particularly in high-school mathematics course taking and in the use of technology. In 1990 compared to 1978, greater percentages of 17-year-olds were continuing in the mathematics course-taking pipeline through Algebra II. However, the overall percentages having taken precalculus or calculus remained quite low (8 percent).

In 1990, students also reported more contact with technology in their mathematics classes. For example, students at all three grades improved in their ability to answer questions with the aid of a calculator. At ages 13 and 17, significantly more students reported access to computers, and the percentages reporting use of computers for mathematics learning also increased significantly. However, in 1990 only about half reported access to a computer to learn mathematics.

At ages 13 and 17, students' perceptions toward mathematics showed few changes between 1978 and 1990. Although about two-thirds expressed confidence in their mathematical abilities and agreed that mathematics helps a person to think logically, only about one-half expressed interest in taking any more mathematics courses. More than one-fourth said they were taking their current course only because they had to and about one-third at each age felt that mathematics is a static discipline where there are seldom new discoveries. At all three ages, the amount of television viewing increased during the 1980s.

READING
1971 to 1990

PART III

TRENDS IN READING ACHIEVEMENT FROM 1971 TO 1990

INTRODUCTION

To monitor progress across time in the reading achievement of American students, NAEP has conducted six national assessments of reading performance involving nationally representative samples of 9-, 13-, and 17-year-olds. These six assessments were conducted in the 1970–71, 1974–75, 1979–80, 1983–84, 1987–88, and 1989–90 school years. They are subsequently referred to by the last half of the school year in which they occurred—1971, 1975, 1980, 1984, 1988, and 1990.

Concern about the reading abilities of our nation's students has increased recently. Although helping students to read beyond only surface understanding has long been a goal of reading instruction, research indicates that students of all ages have difficulty reading thoughtfully.[44] In response to such findings, reading achievement is central to the education goals adopted by the president and the governors.[45] One of the goals states, in part, that students at grades 4, 8, and 12 will demonstrate competency in English, and another focuses on adult literacy and lifelong learning. These goals are unattainable if students are unable to read thoughtfully.

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[44] Ina V.S. Mullis and Lynn B. Jenkins, *The Reading Report Card, 1971-88* (Princeton, NJ: National Assessment of Educational Progress, Educational Testing Service, 1988).

Judith A. Langer, Arthur Applebee, Ina V.S. Mullis, and Mary A. Foertsch, *Learning to Read in Our Nation's Schools* (Princeton, NJ: National Assessment of Educational Progress, Educational Testing Service, 1990).

Richard C. Anderson, Elfrieda H. Hiebert, Judith A. Scott, Ian A. Wilkinson, *Becoming a Nation of Readers* (Washington, DC: National Institute of Education, 1985).

As a whole, Part III of this report is intended to serve as a resource for groups concerned with improving students' reading proficiencies—not only reading experts, but also educators in other subjects, as well as policymakers, school administrators, and parents. The findings can be used, together with information from other sources, as a basis for discussing the adequacy of students' current reading proficiencies, considering factors that appear to be related to reading ability, and developing means for improving reading performance in the years ahead.

NAEP has based its trend reading assessments on a wide range of text materials, from simple narrative passages to complex articles on specialized topics. The selections have included stories, poems, essays, reports, and passages from textbooks of varying levels of difficulty, as well as sample train schedules, telephone bills, and advertisements. Students' comprehension has been assessed in a variety of ways. Some multiple-choice questions require students to identify particular information, while open-ended questions ask them to restructure and interpret what they have read and to present their responses in writing. To measure performance trends, subsets of the same passages and items have been included in several successive assessments.[46]

Students participating in each assessment are asked to provide information on their demographic characteristics, instructional experiences, and reading attitudes and behaviors. The relationships observed between reading performance and self-reported background information can provide a stimulus for educators, reading researchers, and policymakers to discuss central issues and concerns and initiate further inquiries.

NAEP has used analysis techniques based on item response theory (IRT) to estimate students' reading proficiencies on a scale ranging from 0 to 500. The NAEP reading scale is useful in making comparisons across assessments for the three age groups and among subpopulations of students. (The Procedural Appendix contains more detailed information about analysis procedures and student subgroups.) To provide a basis for interpreting the results, the report describes what students attaining different proficiency levels on the scale are able to do. Based on the assessment results, five levels of proficiency were defined: Level 150 — Simple, Discrete Reading Tasks; Level 200 — Partially Developed Skills and Understanding; Level 250 — Interrelates Ideas and Generalizations; Level 300 — Understands Complicated Information; and Level 350 — Learns from Specialized Reading Materials. Essentially, students performing at Level 150 are able to carry out simple, discrete reading tasks. Performance at Level 200 suggests the ability to understand specific or sequentially related information. Performance at Level 250 suggests the ability to search for specific information, interrelate ideas, and make generalizations. Students performing at Level 300 can find, understand, summarize, and explain relatively complicated information. Those performing at Level 350 can synthesize and learn from specialized reading materials.

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[45] *AMERICA 2000: An Education Strategy* (Washington, DC: U.S. Department of Education, 1991).

[46] NAEP's 1990 trend reading assessment measuring trends since 1971 is separate from a second reading assessment also conducted in 1990, which only measures trends since 1988. Students participating in that 1990 reading assessment were selected by new age definitions and were administered new reading items at a different time of year than were those participating in the trend assessment. The results from this assessment will be published in a second reading report. In 1992, NAEP is replacing this short-term trend measure with a newly developed reading assessment that includes longer reading materials like those actually used by readers in their everyday reading, and a large number of open-ended questions. The newly developed materials will be used for the 1992 Trial State Assessment Program in reading at Grade 4.

NAEP reports the performance of groups of students, not individuals. The measures of achievement included in this report are the average reading performance of groups of students on the NAEP proficiency scale, and the percentages of students attaining successive levels of performance on the scale. Because the average proficiencies and the percentages presented in this report are based on samples, they are necessarily estimates. Like all estimates based on surveys, they are subject to sampling as well as measurement error. NAEP uses a complex procedure to compute standard errors that estimates the sampling error and other random error associated with observed assessment results. Statistically significant differences between 1990 and prior assessments are denoted with an asterisk; statistically significant differences between 1971 and subsequent assessments are denoted with a dagger.

Each chapter in Part III provides a somewhat different perspective on trends in students' reading abilities. Chapter 7 describes changes in the average reading performance of 9-, 13-, and 17-year-olds across the six reading trend assessments conducted by NAEP since 1971. In Chapter 8, levels of reading proficiency are defined, and the percentages of students attaining successive levels in each assessment are presented. Chapter 9 summarizes trends in students' responses to questions about their reading instruction and experiences and investigates the relationships between these background factors and reading proficiency.

CHAPTER SEVEN

TRENDS IN READING PROFICIENCY FOR THE NATION AND DEMOGRAPHIC SUBPOPULATIONS

NATIONAL TRENDS IN READING PROFICIENCY FROM 1971 TO 1990

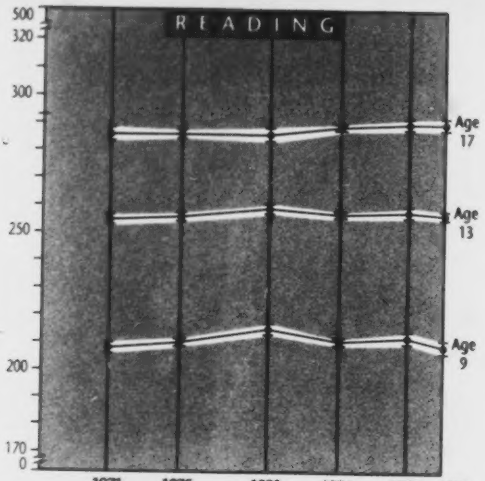
Trends in the average reading abilities of 9-, 13-, and 17-year-old students provide a useful summary of overall changes in reading performance across the past 19 years. The results for the six NAEP reading assessments conducted from 1971 to 1990 are presented in FIGURE 7.1.[47]

The NAEP data indicate that 17-year-old students were reading better in 1990 than were their counterparts in 1971. Thirteen-year-olds and 9-year-olds were reading essentially the same as were their 1971 counterparts. However, the pattern of change observed across the three age groups varied considerably.

[47] The results of statistical tests between various assessment years using multiple comparisons procedures are indicated on FIGURE 7.1. These tests were supported by tests for linear and quadratic trends. At age 9, the linear term was not significant and the quadratic term was significant. At age 13, performance has not differed significantly across the years. At age 17, the trend performance is essentially linear with steady progress being indicated by a significant linear component.

FIGURE 7.1

Trends in Average Reading Proficiency for the Nation, 1971 to 1990



	1971	1975	1980	1984	1988	1990
Age 17	285(1.2)*	286(0.8)*	286(1.2)	289(0.6)	290(1.0)†	290(1.1)†
Age 13	255(0.9)	256(0.8)	259(0.9)	257(0.5)	258(1.0)	257(0.8)
Age 9	208(1.0)	210(0.7)	215(1.0)*†	211(0.7)	212(1.1)	209(1.2)

Ŧ 95 percent confidence interval.

* Statistically significant difference from 1990 and † statistically significant difference from 1971, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 9 comparisons. The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

NINE-YEAR-OLDS. At age 9, students showed significant improvement in reading performance from 1971 to 1980. However, their reading performance declined significantly between 1980 and 1990, returning to approximately the same level as in 1971.

THIRTEEN-YEAR-OLDS. Thirteen-year-olds showed essentially no change in their reading proficiency across the six assessments.

SEVENTEEN-YEAR-OLDS. Trends for in-school 17-year-olds reveal a different pattern. The average reading proficiency of these high-school students was significantly higher in 1990 than it had been from 1971 to 1975. Their average proficiency was also significantly higher in 1988 than it had been in 1971.

TRENDS IN READING PROFICIENCY FROM 1971 TO 1990 BY RACE/ETHNICITY

As shown in FIGURE 7.2,[48] the trends in reading achievement for White, Black, and Hispanic students differ substantially from one another. When one compares the 1990 and 1971 results, little has changed for White students. However, White 9-year-olds showed significant improvement in 1980 and 1984 compared to 1971. Reading proficiency levels for White 13-year-olds were not significantly different in 1990 from 1971, but were significantly higher in 1980 than in 1971. The reading performance of White 17-year-olds was significantly better in 1984 and 1990 than it was in 1971.

Black students at all three age levels achieved significantly higher levels of reading performance in 1990 than in 1971. The reading achievement of Black 9-year-olds was significantly higher for each assessment year compared to 1971. Black 13-year-olds have made large and significant gains since 1971. These students were reading significantly better in 1990 than in any assessment during the nine-year period from 1971 to 1980. Black 17-year-olds also made substantial gains compared to 1971. These students were reading significantly better in 1990 than they had been in the nine-year period from 1971 to 1980. Black 17-year-olds also read significantly better in 1984 and in 1988 than in 1971.

Hispanic 9- and 13-year-olds' performance on the NAEP assessments since 1975 revealed few changes. However, Hispanic 17-year-olds were reading significantly better in 1990 than were their peers in 1975 and 1980. These students also read significantly better in 1984 and 1988 than in 1971.

TRENDS IN READING PROFICIENCY FROM 1971 TO 1990 BY GENDER

As shown in FIGURE 7.3, the reading proficiency of 9-year-old males and females was significantly lower in 1990 than in 1980. However, males had significantly higher performances throughout the 1980s compared to 1971. There were no significant differences in the performance of both 13-year-old males and females between 1971 and 1990, but 17-year-old females showed significantly higher levels of reading proficiency in 1990 than in 1975 and 1980. In contrast, the performance of 17-year-old males was not significantly different in 1990 compared to previous assessments.

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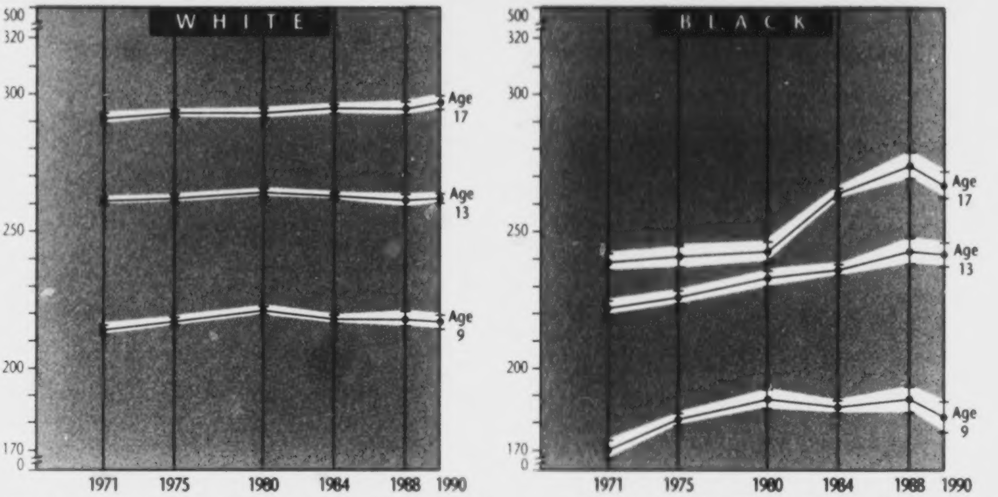
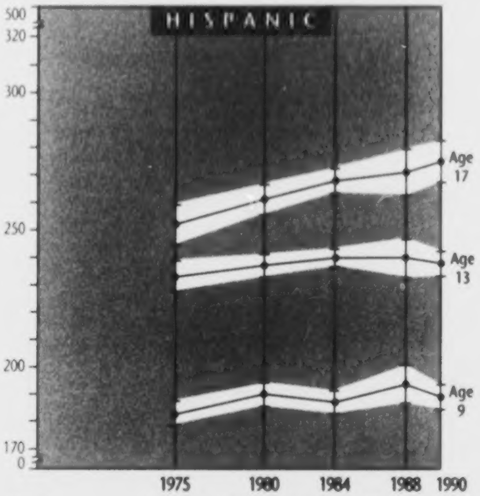
[48] For Asian/Pacific Islander students and American Indian students, the sample sizes were insufficient to permit robust trend estimates.

FIGURE 7.2
Trends in Average Reading Proficiency by Race/Ethnicity, 1971 to 1990



	1971	1975	1980	1984	1988	1990	1971	1975	1980	1984	1988	1990
Age 17	**291(1.0)***	**293(0.6)**	**293(0.9)**	**295(0.7)†**	**295(1.2)**	**297(1.2)†**	**239(1.7)***	**241(2.0)***	**243(1.8)***	**264(1.0)†**	**274(2.4)†**	**267(2.3)†**
	87(1.3)*	84(1.0)*	83(1.6)*	77(0.6)*†	77(0.6)*†	74(0.5)†	11(1.2)*	11(0.8)*	12(1.4)*	14(0.2)*	15(0.3)†	16(0.3)†
Age 13	**261(0.7)**	**262(0.7)**	**264(0.7)†**	**263(0.6)**	**261(1.1)**	**262(0.9)**	**222(1.2)***	**226(1.2)***	**233(1.5)*†**	**236(1.0)†**	**243(2.4)†**	**242(2.2)†**
	84(1.4)*	81(1.2)*	80(1.8)*	77(0.6)*†	76(0.7)†	74(0.8)†	15(1.4)	13(0.9)*	14(1.3)	14(0.2)*	15(0.3)	15(0.2)
Age 9	**214(0.9)**	**217(0.7)**	**221(0.8)†**	**218(0.8)†**	**218(1.4)**	**217(1.3)**	**170(1.7)***	**181(1.2)†**	**189(1.8)†**	**186(1.1)†**	**189(2.4)†**	**182(2.9)†**
	84(1.4)*	80(1.2)*	79(1.3)*	75(1.2)†	75(1.0)†	74(1.0)†	14(1.3)	13(0.8)	14(1.0)	16(0.5)	16(0.7)	16(0.6)



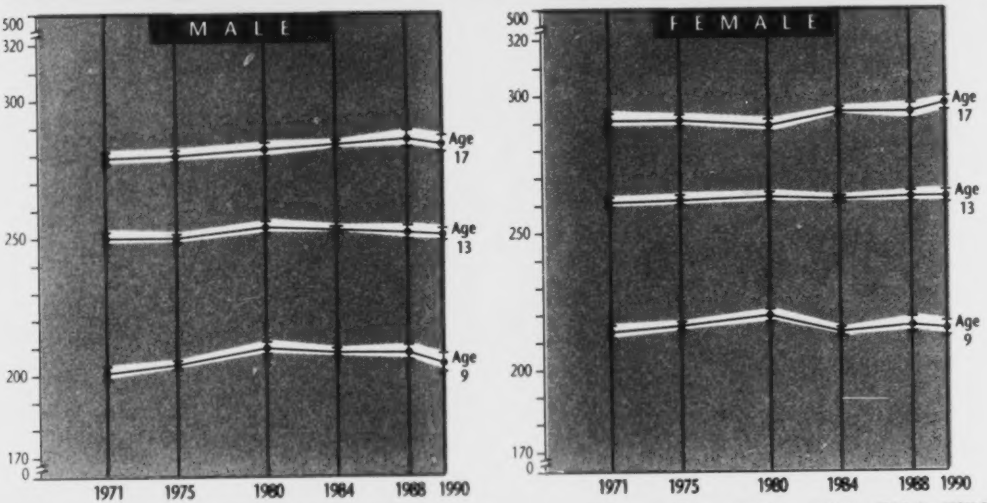
	1975	1980	1984	1988	1990
Age 17	**252(3.6)***	**261(2.7)***	**268(2.2)†**	**271(4.3)†**	**275(3.6)†**
	3(0.6)	4(0.6)	7(0.7)	6(0.5)	7(0.4)
Age 13	**233(3.0)**	**237(2.0)**	**240(1.7)**	**240(3.5)**	**238(2.3)**
	5(0.8)*	6(1.0)	7(0.7)	6(0.6)	8(0.5)†
Age 9	**183(2.2)**	**190(2.3)**	**187(2.1)**	**194(3.5)**	**189(2.3)**
	5(0.8)	6(0.8)	7(1.4)	6(1.0)	6(0.6)

Note: Average proficiencies are in **bold face** type. For each age, the second row of data lists the percentages of students in the total population from each subgroup.

$\overline{\underline{\bullet}}$ 95 percent confidence interval.

* Statistically significant difference from 1990 and † statistically significant difference from 1971 (for White and Black students) or 1975 (for Hispanic students), as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages do not total 100 percent because Asian/Pacific Islander and American Indian student data were analyzed separately. For Asian/Pacific Islander students and American Indian students, the sample sizes were insufficient to permit robust trend estimates.

FIGURE 7.3
Trends in Average Reading Proficiency by Gender, 1971 to 1990



	1971	1975	1980	1984	1988	1990	1971	1975	1980	1984	1988	1990
Age 17	**279(1.2)**	**280(1.0)**	**282(1.3)**	**284(0.6)†**	**286(1.5)†**	**284(1.6)**	**291(1.3)**	**291(1.0)***	**289(1.2)***	**294(0.8)**	**294(1.5)**	**297(1.2)**
	49(0.5)	49(0.5)	51(0.6)	51(0.7)	48(1.4)	50(0.6)	51(0.5)	51(0.5)	50(0.6)	49(0.7)	52(1.4)	50(0.6)
Age 13	**250(1.0)**	**250(0.8)**	**254(1.1)†**	**253(0.6)**	**252(1.3)**	**251(1.1)**	**261(0.9)**	**262(0.9)**	**263(0.9)**	**262(0.6)**	**263(1.0)**	**263(1.1)**
	50(0.4)	50(0.5)	49(0.3)	51(0.5)	50(0.8)	50(0.9)	50(0.4)	50(0.5)	51(0.3)	49(0.5)	51(0.8)	50(0.9)
Age 9	**201(1.1)**	**204(0.8)**	**210(1.1)*†**	**208(0.8)†**	**208(1.4)†**	**204(1.7)**	**214(1.0)**	**216(0.8)**	**220(1.1)*†**	**214(0.8)**	**216(1.3)**	**215(1.2)**
	50(0.4)	50(0.4)	50(0.4)	50(0.5)	50(0.8)	51(0.9)	50(0.4)	50(0.4)	50(0.4)	50(0.5)	50(0.8)	49(0.9)

Note: Average proficiencies are in **bold face** type. For each age, the second row of data lists the percentages of students in the total population from each subgroup.

⌶ 95 percent confidence interval.

* Statistically significant difference from 1990 and † statistically significant difference from 1971, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 9 comparisons. The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

Across the variety of subject areas assessed by NAEP, the results for males and females support numerous studies that have revealed gender differences favoring females in reading and writing, and males in mathematics and science.[49] The NAEP results show that females at all three ages outperformed their male counterparts in each of the six NAEP reading assessments conducted from 1971 to 1990, and that the differences were relatively constant across assessments.

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[49] Gita Z. Wilder and Kristin Powell, *Sex Differences in Test Performance: A Survey of the Literature* (New York: College Entrance Examination Board, 1989).

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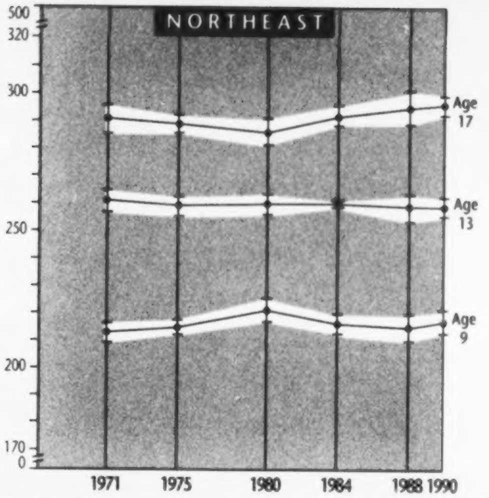
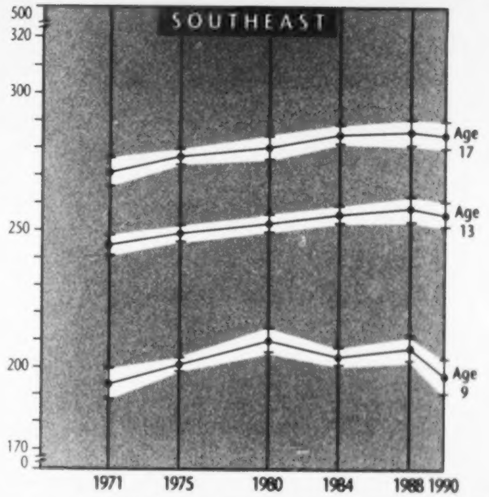
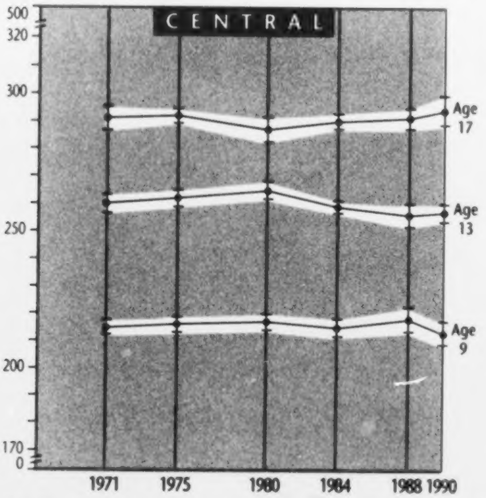
FIGURE 7.4
Trends in Average Reading Proficiency by Region, 1971 to 1990



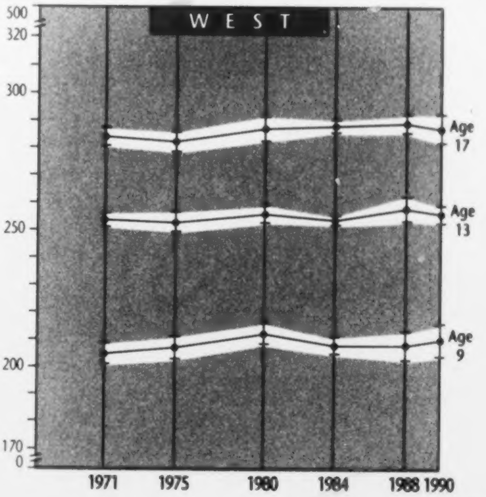
	1971	1975	1980	1984	1988	1990
Age 17	**291(2.8)**	**289(1.7)**	**286(2.4)***	**292(1.9)**	**295(2.9)**	**296(1.8)**
	26(1.9)	26(1.2)	22(2.9)	24(0.4)	23(0.8)	23(1.1)
Age 13	**261(2.0)**	**259(1.8)**	**260(1.8)**	**260(0.6)**	**259(2.4)**	**259(1.8)**
	24(1.5)	25(1.1)	24(2.2)	23(0.4)	23(2.2)	23(1.0)
Age 9	**213(1.7)**	**215(1.3)**	**221(2.1)†**	**216(1.7)**	**215(2.6)**	**217(2.2)**
	26(1.5)	27(1.1)*	23(2.1)	22(0.4)†	22(1.5)	22(1.1)



	1971	1975	1980	1984	1988	1990
Age 17	**271(2.4)***	**277(1.4)***	**280(2.2)†**	**285(1.6)†**	**286(2.1)†**	**285(2.5)†**
	20(1.8)	20(0.8)*	21(1.9)	22(1.8)	23(1.0)	23(0.9)
Age 13	**245(1.7)***	**249(1.5)**	**253(1.6)†**	**256(1.5)†**	**258(2.2)†**	**256(2.2)†**
	24(2.2)	22(1.1)	24(2.7)	23(1.7)	24(1.4)	23(0.8)
Age 9	**194(2.9)**	**201(1.2)**	**210(2.3)*†**	**204(1.6)**	**207(2.1)**	**197(3.2)**
	22(1.7)	22(0.8)	24(2.3)	24(1.2)	25(1.7)	24(1.2)



	1971	1975	1980	1984	1988	1990
Age 17	**291(2.1)**	**292(1.4)**	**287(2.2)**	**290(1.4)**	**291(1.9)**	**294(2.4)**
	30(2.4)	30(1.2)	28(3.2)	27(1.7)	26(1.8)	27(1.0)
Age 13	**260(1.8)**	**262(1.4)**	**265(1.4)***	**259(1.0)**	**256(2.0)**	**257(1.5)**
	29(2.2)	28(1.3)	26(3.5)	27(1.6)	26(2.0)	24(0.7)
Age 9	**215(1.2)**	**216(1.2)**	**217(1.4)**	**215(1.5)**	**218(2.2)**	**213(2.0)**
	29(2.0)	26(1.2)	25(3.4)	27(1.3)	24(0.6)†	25(0.7)



	1971	1975	1980	1984	1988	1990
Age 17	**284(1.8)**	**282(1.9)**	**287(2.1)**	**288(1.1)**	**289(1.8)**	**287(2.6)**
	24(2.4)	25(1.1)	28(2.3)	26(0.6)	28(1.1)	28(0.9)
Age 13	**254(1.3)**	**253(1.7)**	**256(2.0)**	**254(0.9)**	**258(2.1)**	**256(1.6)**
	23(2.3)	26(1.1)*	26(2.3)	27(0.5)	28(1.0)	30(0.9)
Age 9	**205(2.0)**	**207(2.0)**	**213(1.8)**	**208(1.5)**	**208(2.6)**	**210(2.8)**
	23(1.9)*	25(1.1)	28(2.1)	28(0.5)†	29(1.1)	29(0.8)†

Note: Average proficiencies are in **bold face** type. For each age, the second row of data lists the percentages of students in the total population from each subgroup.

± 95 percent confidence interval.

* Statistically significant difference from 1990 and † statistically significant difference from 1971, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 9 comparisons. The standard errors of the estimated proficiencies and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

TRENDS IN READING PROFICIENCY FROM 1971 TO 1990 BY REGION

FIGURE 7.4 presents trends in reading achievement for students from the Northeast, Southeast, Central, and Western regions of the country. The reading achievement of students from the Northeast changed little between 1971 and 1990. Although the achievement of 17-year-olds improved significantly between 1980 and 1990, the net effect was that their performance levels were not significantly different between 1971 and 1990.

In contrast, 13- and 17-year-old students from the Southeast were reading significantly better in 1990 than they were nearly two decades ago. Thirteen- and 17-year-old students were also reading significantly better from 1980 to 1988 than in 1971. After showing dramatic gains in performance from 1971 to 1980, 9-year-old students did significantly worse in 1990 than in 1980. They also were not reading significantly better in 1990 than they were in 1971.

For students in the Central region, the reading performance of both 9- and 17-year-olds remained relatively constant with each assessment. In contrast, the performance of 13-year-olds dropped significantly from 1980 to 1990. Despite some fluctuations, trends in the reading proficiency of 9-, 13-, and 17-year-old students in the Western region did not change significantly.

TRENDS IN READING PROFICIENCY FROM 1971 TO 1990 BY TYPE OF COMMUNITY

Trends in average reading achievement for students living in extreme rural, disadvantaged urban, advantaged urban, and other communities are presented in TABLE 7.1. In general, the performance of students across age groups and types of communities appears to have remained relatively unchanged from 1971 to 1990, even though some groups had shown improvements prior to 1990. Average levels of reading achievement were significantly higher for 17-year-olds in disadvantaged urban populations in 1988 and in other populations in 1990 and 1984 than they had been in 1971. Thirteen-year-olds in extreme rural populations attained higher reading proficiency in 1988 than in 1971; however, there was not a significant difference between 1990 and 1971. Nine-year-olds in extreme rural and in other populations had higher average achievement in 1980 than in 1971, and students from disadvantaged urban populations had higher achievement in 1984 than in 1971.

TABLE 7.1

Trends in Average Reading Proficiency by Type of Community, 1971 to 1990

		AGE 9		AGE 13		AGE 17	
Type of Community	**Year**	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**
Advantaged Urban	1990	11 (2.1)	227 (3.3)	12 (2.1)	270 (3.2)	10 (1.6)	300 (3.8)
	1988	16 (3.2)	222 (2.7)	13 (3.5)	266 (3.3)	16 (4.0)	301 (1.8)
	1984	13 (1.9)	231 (1.7)	11 (2.3)	275 (2.2)	16 (2.7)	302 (2.2)
	1980	14 (2.6)	233 (1.4)	13 (2.0)	277 (1.4)	15 (3.4)	301 (2.2)
	1975	11 (1.5)	227 (1.5)	12 (2.0)	273 (1.4)	10 (1.3)	305 (1.5)
	1971	12 (1.9)	230 (1.3)	12 (1.7)	273 (1.4)	14 (2.6)	306 (2.0)
Disadvantaged Urban	1990	10 (2.7)	186 (4.7)	10 (1.8)	241 (3.2)	8 (2.1)	273 (4.8)
	1988	7 (2.2)	192 (5.5)	7 (2.1)	239 (3.0)	1 (0.6)	275 (2.6)†
	1984	12 (1.9)	192 (1.6)†	9 (1.5)	239 (1.9)	10 (2.2)	266 (2.1)
	1980	6 (1.1)	188 (2.1)	10 (2.1)	242 (3.8)	9 (2.0)	258 (3.0)
	1975	8 (1.1)	184 (2.5)	8 (1.0)	230 (2.7)	11 (1.5)	259 (4.2)
	1971	8 (1.1)	179 (2.7)	7 (1.3)	234 (1.7)	8 (1.7)	260 (2.6)
Extreme Rural	1990	9 (1.8)	209 (4.5)	8 (2.4)	251 (4.7)	13 (2.0)	290 (3.4)
	1988	10 (2.3)	214 (4.2)	6 (2.0)	262 (2.9)†	7 (2.7)	287 (5.2)
	1984	7 (1.2)	201 (3.4)	5 (1.1)	255 (1.9)	5 (1.1)*	283 (3.2)
	1980	9 (1.8)	212 (1.7)†	9 (1.4)	255 (1.9)	8 (1.6)	279 (3.2)
	1975	8 (1.0)	204 (2.5)	8 (1.0)	249 (2.1)	9 (1.4)	282 (2.6)
	1971	9 (1.2)	200 (3.3)	10 (1.5)	247 (2.7)	9 (1.4)	277 (3.4)
Other	1990	70 (4.2)	210 (1.5)	70 (3.3)	258 (0.9)	69 (3.3)	291 (1.2)†
	1988	67 (4.7)	211 (1.4)	73 (4.5)	257 (1.2)	76 (4.7)	288 (1.1)
	1984	68 (2.5)	211 (0.8)	75 (3.1)	257 (0.6)	69 (3.4)	290 (0.6)†
	1980	71 (3.1)	215 (1.1)†	69 (3.1)	258 (0.9)	67 (3.9)	287 (1.0)
	1975	73 (1.8)	211 (0.8)	72 (2.1)	257 (0.9)	70 (2.3)	288 (0.9)
	1971	72 (2.1)	208 (1.1)	71 (2.6)	255 (0.8)	69 (2.8)	285 (1.0)*

[*] Statistically significant difference from 1990 and † statistically significant difference from 1971, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 9 comparisons. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

TRENDS IN READING PROFICIENCY FROM 1971 TO 1990 BY PARENTS' HIGHEST LEVEL OF EDUCATION

TABLE 7.2 presents trends in average reading proficiency by parents' highest level of education. Between 1971 and 1990, the proficiency of students at all three ages whose parents had not graduated from high school was not significantly different. The average reading proficiency of nine-year-old students whose parents had a high-school education remained at the same level as in 1971, and those whose parents

TABLE 7.2

Trends in Average Reading Proficiency by Parents' Highest Level of Education, 1971 to 1990

Level of Education	Year	AGE 9 Percent of Students	AGE 9 Average Proficiency	AGE 13 Percent of Students	AGE 13 Average Proficiency	AGE 17 Percent of Students	AGE 17 Average Proficiency
Didn't Finish High School	1990	5 (0.5)†	193 (3.2)	8 (0.6)†	241 (1.8)	9 (0.6)†	270 (2.8)
	1988	5 (0.6)†	193 (4.9)	8 (0.6)†	247 (2.1)†	9 (0.8)†	267 (2.0)
	1984	6 (0.2)†	195 (1.4)†	9 (0.4)†	240 (0.9)	12 (0.6)*†	269 (1.1)†
	1980	7 (0.5)†	194 (1.6)	10 (0.6)*†	239 (1.1)	13 (0.7)*†	262 (1.5)
	1975	10 (0.4)*	190 (1.3)	14 (0.6)*	239 (1.2)	16 (0.6)*†	263 (1.3)
	1971	10 (0.4)*	189 (1.5)	16 (0.6)*	238 (1.3)	20 (0.8)*	261 (1.5)
Graduated High School	1990	17 (0.8)†	209 (1.8)	31 (1.2)	251 (0.9)†	30 (1.0)	283 (1.4)
	1988	16 (0.6)†	211 (2.2)	31 (1.0)	253 (1.2)	30 (1.2)	282 (1.3)
	1984	19 (0.6)†	209 (1.0)	35 (1.1)*	253 (0.7)	35 (1.1)*	281 (0.7)
	1980	25 (0.8)*†	213 (1.3)	31 (0.7)	254 (0.9)	32 (0.9)	278 (1.0)*†
	1975	24 (0.4)*	211 (0.9)	33 (0.6)	255 (0.7)	34 (0.5)*	281 (1.1)
	1971	22 (0.5)*	208 (1.2)	32 (0.7)	256 (0.8)	31 (0.8)	283 (1.2)
Post High School	1990	42 (1.3)†	218 (2.0)	50 (1.5)†	267 (1.0)	58 (1.3)†	300 (1.1)
	1988	45 (1.4)†	220 (1.7)	52 (1.5)†	265 (1.4)†	58 (1.6)†	300 (1.3)
	1984	36 (1.0)*	223 (0.9)	45 (1.1)†	268 (0.7)	50 (1.2)*	301 (0.7)
	1980	40 (1.5)†	226 (1.1)*	49 (1.3)†	271 (0.8)	51 (1.3)*	299 (1.0)
	1975	34 (0.7)*	222 (0.9)	40 (0.9)*	270 (0.8)	46 (0.8)*	301 (0.7)
	1971	33 (0.9)*	224 (1.1)	38 (1.1)*	270 (0.8)	42 (1.3)*	302 (1.0)

* Statistically significant difference from 1990 and † statistically significant difference from 1971, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 9 comparisons. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students do not total 100 percent because about one-third of the students at age 9 and smaller percentages at ages 13 and 17 reported that they did not know the education level of either parent.

had a post-high-school education declined in 1990 from what it had been in 1980. Thirteen-year-olds whose parents had graduated from high school performed significantly worse in 1990 than in 1971, and 17-year-olds performed better in 1990 than in 1980, but the same as in 1971.

TRENDS IN READING PROFICIENCY FROM 1980 TO 1990 BY TYPE OF SCHOOL Students' average reading proficiency by type of school attended is shown in TABLE 7.3. The average reading proficiency of 13- and 17-year-olds attending public and private schools remained essentially unchanged from 1980 to 1990. However, the performance of 9-year-olds attending public schools was significantly lower in 1990 and 1984, compared to 1980.

TABLE 7.3

Trends in Average Reading Proficiency by Type of School, 1980 to 1990

Type of School	Year	AGE 9 Percent of Students	AGE 9 Average Proficiency	AGE 13 Percent of Students	AGE 13 Average Proficiency	AGE 17 Percent of Students	AGE 17 Average Proficiency
Public	1990	92 (1.9)	208 (1.4)†	88 (1.9)	255 (0.8)	93 (1.5)	289 (1.1)
	1988	88 (2.7)	210 (1.2)	89 (2.5)	256 (1.0)	88 (3.5)	289 (1.0)
	1984	87 (1.7)	209 (0.8)†	88 (1.1)	255 (0.6)	89 (1.7)	287 (0.6)
	1980	89 (1.4)	214 (1.1)*	88 (1.3)	257 (1.1)	93 (1.2)	284 (1.2)
Private	1990	8 (1.9)	228 (3.3)	12 (1.9)	270 (2.9)	7 (1.5)	311 (4.2)
	1988	12 (2.7)	223 (3.0)	11 (2.5)	268 (2.8)	12 (3.5)	300 (3.8)
	1984	13 (1.7)	223 (1.6)	12 (1.1)	271 (1.7)	11 (1.7)	303 (2.0)
	1980	11 (1.4)	227 (1.8)	12 (1.3)	271 (1.5)	7 (1.2)	298 (2.7)

* Statistically significant difference from 1990 and † statistically significant difference from 1971, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparions between previous reading assessments and 1990. The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Data by school type are not available for assessments conducted prior to 1980. Percentages of students may not total 100 percent due to rounding.

TRENDS IN READING PROFICIENCY FROM 1971 TO 1990 BY QUARTILES

TABLE 7.4 presents average reading proficiency from 1971 to 1990 for the top 25 percent of students, the middle 50 percent, and the lowest 25 percent. The results not only demonstrate the range of performance within each assessment, but also provide information about where gains and losses occurred for students across the distribution.

At the lower 25 percent, 9-year-old students' average proficiency in 1990 decreased significantly from what it had been from 1975 to 1984. Average reading proficiency also decreased significantly for the middle 50 percent in 1990 compared to the average proficiency of their peers from 1975 to 1988. In contrast, the proficiency of 9-year-olds in the upper 25 percent in 1990 increased significantly between 1971 and 1990.

Thirteen-year-olds showed fewer significant changes than did 9-year-olds. For the upper 25 percent, average proficiency in 1990 was significantly higher than in 1971 or 1980. However, for the middle 50 percent, average proficiency was significantly lower in 1990 than in 1980. The average proficiency of the lower 25 percent in 1990 increased significantly from 1975, but declined from 1980.

TABLE 7.4

Trends in Average Reading Proficiency by Quartiles, 1971 to 1990

		AVERAGE PROFICIENCY		
Quartile	**Year**	**Age 9**	**Age 13**	**Age 17**
Upper 25%	1990	261 (1.1)†	297 (0.8)†	336 (1.1)
	1988	259 (1.6)†	296 (1.0)	330 (1.3)*
	1984	258 (0.4)*†	296 (0.5)†	331 (0.5)*
	1980	255 (0.8)*	294 (0.5)*	327 (0.8)*†
	1975	251 (0.7)*	296 (0.4)†	334 (0.5)
	1971	253 (0.5)*	293 (0.4)*	333 (0.6)
Middle 50%	1990	209 (0.6)	258 (0.5)	292 (0.5)†
	1988	213 (0.7)*	259 (0.7)	292 (0.7)†
	1984	212 (0.3)*	258 (0.2)	291 (0.3)†
	1980	218 (0.3)*†	261 (0.3)*†	289 (0.4)*
	1975	213 (0.3)*†	258 (0.5)	288 (0.4)*
	1971	211 (0.4)	258 (0.4)	289 (0.5)*
Lower 25 %	1990	157 (1.5)	215 (0.9)	241 (1.6)†
	1988	163 (1.6)†	217 (1.0)†	246 (1.1)†
	1984	162 (0.6)*†	215 (0.5)	241 (0.3)†
	1980	169 (1.0)*†	219 (0.7)*†	238 (1.0)†
	1975	163 (0.5)*†	211 (0.4)*	232 (1.0)*
	1971	157 (0.7)	212 (0.7)	230 (0.8)*

* Statistically significant difference from 1990 and † statistically significant difference from 1971, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 9 comparisons. The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

In contrast to the changes in performance observed for 9- and 13-year-olds, the middle 50 percent and lower 25 percent of 17-year-old students showed significant increases in proficiency from 1971 to 1990. For 17-year-olds at the upper 25 percent, proficiency in 1990 was significantly higher than in 1980, but was not significantly different from 1971.

SUMMARY NAEP found few dramatic changes in average reading proficiency for the nation or for most subpopulations of students between 1971 and 1990. The overall picture suggests a nation of students who were reading as well as or better than their counterparts did in 1971. Seventeen-year-olds were reading significantly better in 1990 than they were in 1971, and 9- and 13-year-olds were reading essentially the same as they were in 1971.

Although Black students at all three ages were reading significantly better in 1990 than in 1971, performance has leveled off in the more recent assessments. For Hispanic students, there have been few improvements since 1975, except for 17-year-olds.

Seventeen-year-old females showed an increase in performance in the most recent assessment as compared to 1975 and 1980. However, the performance of 9-year-old males and females was significantly lower in 1990 compared to 1980.

At ages 13 and 17, students in the Southeast showed significant increases between 1971 and 1990. Proficiency for students in extreme rural, disadvantaged urban, and advantaged urban communities fluctuated across the 19-year-period, but reading levels remained essentially unchanged.

The average proficiency of students at all three assessment ages in 1990 increased significantly from 1971 for 9- and 13-year-olds in the upper 25 percent, and for 17-year-olds in the middle and lower 25 percent. However, 9- and 13-year-olds showed significant decreases in proficiency in 1990, compared to 1980, in the middle 50 percent and lower 25 percent, after showing increases between 1971 and 1980.

C H A P T E R   E I G H T

TRENDS IN LEVELS OF READING PROFICIENCY FOR THE NATION AND DEMOGRAPHIC SUBPOPULATIONS

NATIONAL TRENDS IN LEVELS OF READING PROFICIENCY FROM 1971 TO 1990

This chapter provides detailed information on trends in the levels of reading proficiency demonstrated by students across the six reading assessments, elaborating on the average reading proficiency results discussed in Chapter Seven. To describe students' reading skills and strategies, five levels of proficiency have been defined on the NAEP reading scale.

To provide a basis for describing or "anchoring" performance at the five levels on the scale, NAEP used empirical procedures to delineate sets of items and passages that discriminated between adjacent performance levels — that is, items likely to be answered correctly by students performing at one of these five levels on the scale, and much less likely to be answered correctly by students performing at the next lower level.[50]

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[50] In theory, proficiency levels above 350 or below 150 could have been defined; however, so few students in the assessment performed at the extreme ends of the scale that it was not practical to do so.

The set of items at each of the five levels was analyzed by a panel of reading experts, who carefully considered passage and item characteristics, as well as passage-item interactions, to discern the types of reading behaviors demonstrated by correct responses to the items in the set. These analyses indicated that the interaction of three factors affects students' reading proficiency: the complexity of the material they were asked to read, their familiarity with the subject matter, and the kinds of questions asked.

Short passages made up of a few simple sentences were easiest for students to comprehend. More dense and complex passages were more difficult. When the passages dealt with general, "everyday" topics, the students had less difficulty than when the information was specialized.

Questions were designed to assess a range of comprehension skills — from identifying words in a passage and making substantial inferences, to reformulating and extending the ideas presented. Success in answering questions seemed to be a function of both the passage complexity and the nature of the questions. Students could answer questions requiring generalizations about short, simple passages; conversely, they had difficulty answering questions about specific facts when these facts were embedded in complex texts. In addition, questions asking students to put their answers in writing tended to be more difficult than multiple-choice questions did, particularly when students had to recast the information presented in the passage.

This suggests that the relationship between the complexity of the passage and the way in which the reader needs to go about finding the answer to a particular question shapes the demands of a reading task.[51] The many possible interactions among the passage, question, and reader's prior knowledge are reflected in the NAEP results. FIGURE 8.1 briefly describes five levels of proficiency defined by the kinds of reading that most students at each level were able to do.

TABLE 8.1 presents the percentages of students who performed at or above each reading proficiency level in the six reading assessments conducted by NAEP since 1971. Across the years, virtually all students displayed rudimentary reading skills and strategies, characterized by the ability to perform relatively uncomplicated, discrete reading tasks successfully (Level 150). At the other extreme, very few students in any assessment reached the highest level of reading proficiency defined, reflecting their difficulty in comprehending passages that are more lengthy and complex or that deal with specialized

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[51] R.C. Anderson, and P. David Pearson, A Schema-Theoretic View of Basic Processes in Reading. In P. David Pearson (Ed.) *Handbook of Reading Research*, (New York: Longman, 1984).

Janice A. Dole, Gerald G. Duffy, Laura R. Roehler, and P. David Pearson, Moving from the Old to the New: Research on Reading Comprehension Instruction, *Review of Educational Research*, Vol. 61, No. 2, 1991 pp. 239-264.

FIGURE 8.1

Levels of Reading Proficiency

LEVEL 350 **LEARN FROM SPECIALIZED READING MATERIALS**

Readers at this level can extend and restructure the ideas presented in specialized and complex texts. Examples include scientific materials, literary essays, and historical documents. Readers are also able to understand the links between ideas, even when those links are not explicitly stated, and to make appropriate generalizations. Performance at this level suggests the ability to synthesize and learn from specialized reading materials.

LEVEL 300 **UNDERSTAND COMPLICATED INFORMATION**

Readers at this level can understand complicated literary and informational passages, including material about topics they study at school. They can also analyze and integrate less familiar material and provide reactions to and explanations of the text as a whole. Performance at this level suggests the ability to find, understand, summarize, and explain relatively complicated information.

LEVEL 250 **INTERRELATE IDEAS AND MAKE GENERALIZATIONS**

Readers at this level use intermediate skills and strategies to search for, locate, and organize the information they find in relatively lengthy passages and can recognize paraphrases of what they have read. They can also make inferences and reach generalizations about main ideas and author's purpose from passages dealing with literature, science, and social studies. Performance at this level suggests the ability to search for specific information, interrelate ideas, and make generalizations.

LEVEL 200 **PARTIAL SKILLS AND UNDERSTANDING**

Readers at this level can locate and identify facts from simple informational paragraphs, stories, and news articles. In addition, they can combine ideas and make inferences based on short, uncomplicated passages. Performance at this level suggests the ability to understand specific or sequentially related information.

LEVEL 150 **SIMPLE, DISCRETE READING TASKS**

Readers at this level can follow brief written directions. They can also select words, phrases, or sentences to describe a simple picture and can interpret simple written clues to identify a common object. Performance at this level suggests the ability to carry out simple, discrete reading tasks.

subject matter (Level 350).

The results for the three age levels have been placed on a common scale to track growth across schooling, as well as trends. Expectations are that students at each successively older age will perform better — and they do. In 1990, students showed tremendous growth from age 9 to age 17 in the types of reading tasks they were able to perform.

Comparisons of performance levels in 1990 with those in 1971 reflect significant increases in average performance for 17-year-olds at Level 250.

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TABLE 8.1

Trends in Percentages of Students at or Above Five Reading Proficiency Levels, 1971 to 1990*

		YEARS					
Skills and Strategies	**AGE**	1971	1975	1980	1984	1988	1990
LEVEL 350*							
Learn from Specialized Reading Materials	9	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.1)
	13	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.1)	0 (0.1)	0 (0.1)
	17	7 (0.4)	6 (0.3)	5 (0.4)*	6 (0.3)	5 (0.6)*	7 (0.5)
LEVEL 300							
Understand Complicated Information	9	1 (0.1)	1 (0.1)	1 (0.1)	1 (0.1)	1 (0.3)	2 (0.3)
	13	10 (0.5)	10 (0.5)	11 (0.5)	11 (0.4)	11 (0.8)	11 (0.6)
	17	39 (1.0)	39 (0.8)	38 (1.1)	40 (0.8)	41 (1.5)	41 (1.0)
LEVEL 250							
Interrelate Ideas and Make Generalizations	9	16 (0.6)	15 (0.6)*	18 (0.8)	17 (0.6)	18 (1.1)	18 (1.0)
	13	58 (1.1)	59 (1.0)	61 (1.1)	59 (0.6)	59 (1.3)	59 (1.0)
	17	79 (0.9)*	80 (0.7)*	81 (0.9)	83 (0.5)	86 (0.8)	84 (1.0)
LEVEL 200							
Partial Skills and Understanding	9	59 (1.0)	62 (0.8)	68 (1.0)*	62 (0.7)	63 (1.3)	59 (1.3)
	13	93 (0.5)	93 (0.4)	95 (0.4)	94 (0.3)	95 (0.6)	94 (0.6)
	17	96 (0.3)	96 (0.3)	97 (0.3)	98 (0.1)	99 (0.3)	98 (0.3)
LEVEL 150							
Simple, Discrete Reading Tasks	9	91 (0.5)	93 (0.4)*	95 (0.4)*	92 (0.3)	93 (0.7)	90 (0.9)
	13	100 (0.0)	100 (0.1)	100 (0.0)	100 (0.0)	100 (0.1)	100 (0.1)
	17	100 (0.1)	100 (0.1)	100 (0.1)	100 (0.1)	100 (0.0)	100 (0.1)

* Statistically significant difference from 1990, as determined by an application of the Bonterroni procedure, where alpha equals .05 per set of comparisons between previous reading assessments and 1990. Thus, alpha equals .01 for each comparison. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the percentage of students is either 0 or 100 percent, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent, and percentages less than .5 percent were rounded to 0 percent.

LEVEL 150: SIMPLE, DISCRETE READING TASKS. Students performing at this level of proficiency were able to read and understand brief, uncomplicated passages and respond correctly to questions based on information presented in the passage—for example, questions asking them to recall particular details.

In each assessment, virtually all 13- and 17-year-olds and most 9-year-olds reached or surpassed this level of reading proficiency. However, the percentage of 9-year-olds at or above Level 150 in 1990 declined significantly from 1975 and 1980, and remained essentially the same as it was in 1971. Ten percent of the students at age 9 — most of whom are in the third or fourth grade — have not yet mastered rudimentary reading skills and strategies. Lacking a strong foundation in reading, these students are likely to be vulnerable to academic difficulties as they proceed through school.[52]

LEVEL 200: PARTIALLY DEVELOPED SKILLS AND UNDERSTANDING. Students performing at Level 200 demonstrated partial use of reading skills and strategies, evidenced by their basic understanding of stories and expository passages, ability to summarize main ideas, and capacity to distill information from the material presented.

Almost all students at age 17 performed at or above Level 200 on all six assessments. At age 9, however, the proportion of students demonstrating some use of reading skills and strategies declined significantly since 1980, when 68 percent of the students performed at or above this level. Only 59 percent did so in 1990. Performance in 1990 represented a return to 1971 levels.

LEVEL 250: INTERRELATE IDEAS AND MAKE GENERALIZATIONS. The reading passages that characterize Level 250 performance tend to be longer and more complex than those at the lower levels, and the questions are more demanding, asking students to interpret, make inferences from, and elaborate on the information and ideas presented.

In the 1990 assessment, as with previous NAEP reading assessments, there were large differences across the age groups in the ways that the percentages of students who demonstrated reading skills and strategies at this level changed across time. Since 1971, the percentage of 9- and 13-year-olds reaching Level 250 remained constant. Over the same time period, however, the percentage of 17-year-olds who reached Level 250 increased, from 79 percent in 1971 and 80 percent in 1975 to 84 percent in 1990.

LEVEL 300: UNDERSTAND COMPLICATED INFORMATION. Performance at Level 300 indicates an ability to read and comprehend a wide variety of text materials, including various types of informational and literary passages as well as documents. It also reflects the ability to summarize and elaborate on the information and ideas presented. To a greater extent than at the lower levels of proficiency, the reader performing at this level is attentive to genre, form, and rhetorical features.

There have not been significant changes across time in the percentage of students performing at this level of reading proficiency across age groups. While most 9-year-old students would not be expected to have mastered the skills and strategies associated with this level of performance, it seems reasonable to expect higher percentages of 13- and 17-year-olds to do so. The failure of students in the highest age group—most of whom represent high-school juniors—to demonstrate this level of reading proficiency suggests a need to strengthen their literacy skills prior to high-school graduation.

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[52] Jeanne S. Chall, Vicki A. Jacobs, and Luke E. Baldwin, *The Reading Crisis: Why Poor Children Fall Behind,* (Cambridge, MA: Harvard University Press, 1990).

LEVEL 350: LEARN FROM SPECIALIZED READING MATERIALS. Performance at the highest level on the NAEP reading proficiency scale reflects the ability to integrate ideas and information presented in a variety of genres, to understand specialized content, and make meaning from passages that contain challenging syntactic and rhetorical elements. Many of the questions following the passages at this level are open-ended, asking students to articulate their views and ideas based on the selection presented.

The percentage of students across age groups who reached level 350 in the 1990 assessment is essentially unchanged from 1971. Virtually none of the 13-year-olds reached Level 350 during the past six assessments, and very few 17-year-olds reached this level. It appears that most in-school 17-year-olds lack the advanced reading skills and strategies needed to comprehend the kinds of specialized written materials that are prevalent in business and higher education.

Viewed in their entirety, these results offer a picture of mixed successes and shortcomings. While most students seem to have mastered intermediate reading skills and strategies by the time they approach the end of high school, far fewer reached the highest levels of reading proficiency defined by NAEP.

TRENDS IN LEVELS OF READING PROFICIENCY FROM 1975 TO 1990 BY RACE/ETHNICITY

TABLE 8.2 shows the percentage of 9-, 13-, and 17-year-old Black, White, and Hispanic students performing at or above each of the scale levels.[53]

The percentage of White students at all three ages who performed at or above Levels 300 and 350 of the scale remained essentially unchanged from 1975 to 1990. The only significant increase for White students occurred at age 9 at Level 250. In contrast, a higher percentage of Black 13-year-olds and Black and Hispanic 17-year-olds performed at or above Level 250 in 1990 than in 1975. A significantly higher percentage of Black and Hispanic 17-year-olds also performed at or above Level 300 in 1990 than in 1975.

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[53] Trends in percentages of students performing at or above each of the five levels in all assessments by race/ethnicity and gender are presented in the Data Appendix.

TABLE 8.2

Trends in Percentages of Students at or Above Five Reading Proficiency Levels by Race/Ethnicity, 1975 to 1990

		1975			1990		
Levels	**Age**	**White**	**Black**	**Hispanic**	**White**	**Black**	**Hispanic**
LEVEL 350							
Learn from	9	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.1)	0 (0.0)	0 (0.0)
Specialized Reading	13	0 (0.1)	0 (0.0)	0 (0.0)	1 (0.2)	0 (0.3)	0 (0.2)
Materials	17	7 (0.4)	0 (0.3)	1 (0.6)	9 (0.6)	2 (1.0)	2 (1.4)
LEVEL 300							
Understand	9	1 (0.1)	0 (0.0)	0 (0.0)	2 (0.4)	0 (0.2)	0 (0.3)
Complicated	13	12 (0.5)	2 (0.3)	2 (1.0)	13 (0.9)	5 (0.8)	4 (1.2)
Information	17	44 (0.8)	8 (0.7)*	13 (2.7)*	48 (1.2)	20 (1.8)	27 (3.3)
LEVEL 250							
Interrelate	9	17 (0.7)*	2 (0.3)	3 (0.5)	23 (1.2)	5 (1.5)	6 (2.0)
Ideas and Make	13	66 (0.9)	25 (1.6)*	32 (3.6)	65 (1.2)	42 (3.5)	37 (2.9)
Generalizations	17	86 (0.6)	43 (1.6)*	53 (4.1)*	88 (1.1)	69 (2.8)	75 (4.7)
LEVEL 200							
Partial Skills and	9	69 (0.8)	32 (1.5)	35 (3.0)	66 (1.4)	34 (3.4)	41 (2.7)
Understanding	13	96 (0.2)	77 (1.3)*	81 (2.3)	96 (0.6)	88 (2.3)	86 (2.4)
	17	99 (0.1)	82 (1.8)*	89 (2.4)*	99 (0.2)	96 (1.3)	96 (2.1)
LEVEL 150							
Simple, Discrete	9	96 (0.3)	81 (1.1)	81 (2.5)	94 (0.9)	77 (2.7)	84 (1.8)
Reading Tasks	13	100 (0.0)	98 (0.3)	100 (0.3)	100 (0.1)	99 (0.5)	99 (0.5)
	17	100 (0.0)	98 (0.8)	99 (0.4)	100 (0.0)	100 (0.8)	100 (0.0)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous reading assessments and 1990. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the percentage of students is either 0 or 100 percent, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent, and percentages less than .5 percent were rounded to 0 percent. The reading achievement of Hispanic students was not examined separately prior to the 1975 assessment. For Asian/Pacific Islander students and American Indian students, samples were insufficient to permit robust trend estimates.

TRENDS IN LEVELS OF READING PROFICIENCY FROM 1971 TO 1990

BY GENDER As shown in TABLE 8.3, the reading proficiency of males trailed that of females in 1971 and in 1990 at all five scale levels, with the gap between the two groups staying about the same in 1990 as in 1971. The only significant increases from 1971 to 1990 occurred at Level 250 for 17-year-old males and females. However, the percentage of 17-year-old males and females who performed at or above Levels 150, 300, and 350 did not differ from 1971 to 1990.

TABLE 8.3
Trends in Percentages of Students at or Above Five Reading Proficiency Levels by Gender, 1971 to 1990

Skills and Strategies	Age	1971 Male	1971 Female	1990 Male	1990 Female
LEVEL 350					
Learn from Specialized Reading Materials	9	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.1)
	13	0 (0.0)	0 (0.1)	0 (0.1)	1 (0.2)
	17	5 (0.4)	8 (0.5)	6 (0.5)	9 (0.7)
LEVEL 300					
Understand Complicated Information	9	1 (0.2)	1 (0.2)	1 (0.3)	2 (0.5)
	13	7 (0.5)	12 (0.6)	8 (0.8)	15 (0.9)
	17	34 (1.1)	44 (1.2)	36 (1.5)	47 (1.3)
LEVEL 250					
Interrelate Ideas and Make Generalizations	9	12 (0.6)*	19 (0.8)	16 (1.2)	21 (1.2)
	13	52 (1.2)	64 (1.1)	52 (1.5)	65 (1.5)
	17	74 (1.0)*	83 (1.0)*	80 (1.4)	89 (1.0)
LEVEL 200					
Partial Skills and Understanding	9	53 (1.2)	65 (1.1)	54 (1.9)	64 (1.2)
	13	91 (0.7)	95 (0.4)	91 (0.9)	96 (0.6)
	17	95 (0.4)	97 (0.3)	97 (0.6)	99 (0.3)
LEVEL 150					
Simple, Discrete Reading Tasks	9	88 (0.7)	93 (0.5)	88 (1.4)	92 (1.1)
	13	100 (0.1)	100 (0.1)	100 (0.2)	100 (0.1)
	17	99 (0.1)	100 (0.1)	100 (0.3)	100 (0.1)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous reading assessments and 1990. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the percentage of students is either 0 or 100 percent, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent, and percentages less than .5 percent were rounded to 0 percent.

TRENDS IN READING PERFORMANCE FROM 1984 TO 1990 ON CONSTRUCTED-RESPONSE QUESTIONS

To assess their ability to respond critically, a subset of the questions underlying the NAEP reading trend scale asked students to analyze, interpret, and evaluate what they had read, and to do so in writing. These tasks required students not only to reason effectively, but to communicate their ideas in ways that others could understand. The tasks are described in FIGURE 8.2.

FIGURE 8.2
Constructed-Response Assessment Tasks, 1984 to 1990

TASK 1
(Science passage) Students were asked to read it and discuss the main idea.

TASK 2
(Biographical piece) Students were asked to read it and then interpret the writer's view.

TASK 3
(Informative piece) Students were asked to make comparisons between what they had read and their own experiences.

TASK 4
(Informative piece) Students were asked to interpret how the writer conveyed a particular impression.

TASK 5
(Historical piece) Students were asked to compare and contrast information contained in the article.

TASK 6
(Humorous piece) Students were asked to evaluate it.

TASK 7
(Literary piece) Students read it in order to discuss the mood.

TASK 8
(Informative piece) Students were asked to discuss what it was about.

For each task, students' responses were evaluated based on their overall success in responding to the question and the extent to which ideas were substantiated with evidence from the passage. Responses were rated as being either unsatisfactory, minimal, satisfactory, or elaborated. Responses rated as unsatisfactory did not address the task, providing irrelevant or inappropriate comments or information. Minimal responses indicated a partial understanding of the task, generally reflecting incomplete comprehension of the passage. Satisfactory responses included enough detail to indicate that students had successfully comprehended the passage, providing the appropriate response to the task and some support for their ideas. Elaborated responses went beyond a basic understanding of the passage by restructuring or extending ideas in the passage and providing relevant support. They identified relations among ideas, even when the relations were not stated explicitly.

In general, students had great difficulty providing thoughtful and complete responses to the constructed-response questions. TABLE 8.4 shows that across Tasks 1, 2, and 3, most 9-year-olds produced unsatisfactory or minimal responses. The percentages producing these responses did not change significantly from 1984 to 1990, except on Task 1. In 1990, a significantly higher percentage of 9-year-olds provided an unsatisfactory

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TABLE 8.4

Trends in Students' Responses to Constructed-Response Questions, 1984 to 1990

Tasks	Rating	1984			1990		
		AGE 9	AGE 13	AGE 17	AGE 9	AGE 13	AGE 17
Task 1	Unsatisfactory	69 (1.8)*	47 (1.8)	34 (1.1)	77 (2.4)	52 (2.7)	37 (2.5)
	Minimal	29 (1.6)*	41 (1.5)*	43 (1.4)	21 (2.3)	33 (2.4)	38 (1.7)
	Satisfactory	2 (0.5)	11 (1.0)	21 (0.8)	2 (0.7)	14 (1.7)	24 (2.0)
	Elaborated	0 (0.0)	1 (0.3)	3 (0.3)	0 (0.0)	1 (0.5)	0 (0.3)
Task 2	Unsatisfactory	28 (1.6)	—	—	24 (1.9)	—	—
	Minimal	57 (1.6)	—	—	60 (2.2)	—	—
	Satisfactory	14 (1.0)	—	—	15 (1.7)	—	—
	Elaborated	1 (0.1)	—	—	1 (0.4)	—	—
Task 3	Unsatisfactory	56 (1.8)	—	17 (1.0)	56 (2.9)	—	22 (1.7)
	Minimal	40 (2.0)	—	59 (1.1)*	40 (3.0)	—	49 (1.8)
	Satisfactory	4 (0.7)	—	22 (1.1)*	4 (1.3)	—	25 (1.5)
	Elaborated	0 (0.1)	—	3 (0.3)	0 (0.0)	—	4 (0.7)
Task 4	Unsatisfactory	—	53 (1.4)	45 (1.5)	—	54 (2.1)	40 (2.9)
	Minimal	—	40 (1.3)	47 (1.6)	—	41 (1.9)	48 (2.8)
	Satisfactory	—	7 (0.8)	8 (0.8)	—	5 (0.7)	12 (1.5)
	Elaborated	—	1 (0.2)	1 (0.2)	—	1 (0.3)	0 (0.4)
Task 5	Unsatisfactory	—	24 (0.9)	15 (0.8)*	—	21 (2.1)	21 (2.1)
	Minimal	—	41 (1.2)	51 (1.2)	—	43 (2.4)	47 (2.2)
	Satisfactory	—	33 (1.3)	33 (1.5)	—	35 (2.1)	32 (2.0)
	Elaborated	—	2 (0.3)	1 (0.2)	—	1 (0.3)	0 (0.2)
Task 6	Unsatisfactory	—	—	3 (0.5)	—	—	2 (0.7)
	Minimal	—	—	76 (1.2)	—	—	80 (1.8)
	Satisfactory	—	—	19 (1.0)	—	—	18 (1.7)
	Elaborated	—	—	2 (0.4)	—	—	1 (0.2)
Task 7	Unsatisfactory	—	—	3 (0.4)	—	—	3 (0.6)
	Minimal	—	—	18 (0.9)	—	—	20 (1.6)
	Satisfactory	—	—	18 (0.6)	—	—	20 (1.4)
	Elaborated	—	—	62 (1.1)	—	—	57 (1.9)
Task 8	Unsatisfactory	—	—	48 (1.5)	—	—	47 (2.9)
	Minimal	—	—	40 (1.5)	—	—	41 (2.5)
	Satisfactory	—	—	11 (0.9)	—	—	12 (1.5)
	Elaborated	—	—	1 (0.3)	—	—	1 (0.3)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous reading assessments and 1990. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is either 0 percent or 100 percent, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent, and percentages less than .5 percent were rounded to 0 percent. Percentages of students may not total 100 percent due to rounding.

discussion of the main idea in a science passage (Task 1), and a significantly lower percentage provided a minimal response than did their peers in 1984.

Similar to the 9-year-olds, 13-year-olds showed few changes between 1984 and 1990. When given the same science passage as 9-year-olds, a significantly lower percentage of 13-year-old students provided minimal responses in 1990 than in 1984. However, there were no significant changes in the percentage of 13-year-olds' responses to Tasks 4 and 5.

At age 17, students showed essentially no change in their performance between 1984 and 1990 on five out of seven constructed-response questions. Significantly fewer students in 1990 than in 1984 provided a minimal response to a question asking them to read an informative piece and compare their own experiences to what they had read (Task 3). A significantly higher percentage of the 17-year-olds assessed in 1990 who were asked to compare and contrast information contained in a history passage (Task 5) provided an unsatisfactory response.

SUMMARY In 1990, almost all 9-year-olds were able to carry out simple, discrete reading tasks (Level 150), and a majority demonstrated partially developed comprehension skills (Level 200). However, the percentage of 9-year-olds who reached or surpassed Level 200 declined significantly since 1980, and the percentage performing at or above Level 250 remained essentially unchanged from 1971 to 1990. Overall, significantly more 9-year-olds in 1990 than in 1975 — just 18 percent — demonstrated a grasp of interrelating ideas or making generalizations from passages as typified by performance at Level 250.

At age 13, the percentage of students who performed at or above Level 200 remained unchanged across time.

Among the in-school 17-year-olds assessed by NAEP, significantly more (84 percent) performed at or above Level 250 in 1990 than in 1975 or 1971.

For the nation as a whole, these results represent few changes from assessment to assessment, except at age 17, where the percentage of students reaching Level 250 rose significantly. Parallel increases were found at age 17 for both males and females at Level 250.

White students showed consistent performance between 1975 and 1990; the only significant improvement was at age 9 in the percentage of students performing at or above Level 250. In contrast, Black 13-year-olds showed significant progress between 1975 and 1990 at Levels 200 and 250, while Black 17-year-olds had significant gains at Levels 250 and 300. At age 17, significantly greater percentages of Hispanic students reached Levels 250 and 300, although performance was more stable across assessments at the other two ages.

In sum, the results indicate some signs of improvement, particularly at ages 13 and 17 for Black students and at age 17 for Hispanic students. However, the findings are primarily characterized by their uniformity across assessments, and the low percentages of students performing at the higher levels (Level 250 and above) of reading ability defined by NAEP. Finally, when asked to formulate their responses in writing, students had great difficulty in composing thoughtful analyses or interpretations.

CHAPTER NINE

PATTERNS AND TRENDS IN SCHOOL AND HOME CONTEXTS FOR READING

INTRODUCTION

This chapter discusses changes across time in some of the factors thought to be related to students' reading proficiency, including exposure to reading at school and in the home, the amount of time spent doing homework, and the nature of students' reading experiences and habits. The primary aim is to examine trends in students' instructional, individual, and home experiences as they relate to reading performance and, in turn, to identify changes that may have occurred in these relationships across time.

TRENDS IN READING ACROSS THE CURRICULUM FROM 1984 TO 1990

Because in-school reading activities influence the development of students' reading abilities, attitudes, and habits considerably, NAEP asked students participating in the 1984 and 1990 reading assessments to report on the kinds of school-related materials they read. TABLE 9.1 displays the percentages of students who reported ever reading poems, plays, biographies, science books, and books about other times and places, such as those that would be read in social studies or history class.

In general, the percentage of 9-year-olds who reported reading different types of materials did not change from 1984 to 1990. However, significantly fewer 9-year-olds reported reading plays in 1990 than those assessed in 1984. In contrast, more 13- and 17-year-olds appeared to be reading in the language arts, particularly poems, in 1990 than in 1984.

TABLE 9.1

Trends in Reading Certain Types of Materials, 1984 to 1990

		AGE 9		AGE 13		AGE 17	
Types of Materials	**Year**	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**
Poems	1990	66 (2.2)	208 (2.4)	75 (1.7)	260 (2.0)	82 (1.5)	293 (1.8)
	1984	70 (1.5)	211 (1.9)	68 (1.3)*	260 (1.2)	76 (1.1)*	290 (1.5)
Plays	1990	45 (2.1)	206 (3.2)	62 (2.0)	262 (1.7)	67 (1.9)	293 (2.1)
	1984	56 (1.4)*	211 (2.5)	59 (1.4)	260 (1.3)	63 (1.0)	290 (1.7)
Biographies	1990	46 (3.0)	212 (2.9)	62 (1.9)	262 (1.6)	64 (2.3)	295 (2.5)
	1984	45 (1.5)	213 (2.4)	62 (1.3)	261 (1.3)	59 (1.2)	292 (1.4)
Science Books	1990	86 (1.7)	209 (1.9)	90 (1.5)	260 (1.3)	76 (1.4)	293 (1.9)
	1984	84 (1.3)	212 (1.6)	90 (1.1)	259 (1.2)	70 (1.1)*	289 (1.4)
Books About Other Places	1990	75 (1.6)	210 (2.2)	83 (1.4)	260 (1.9)	81 (1.6)	293 (1.8)
	1984	79 (1.2)	211 (1.7)	83 (1.1)	259 (1.1)	81 (0.9)	289 (1.4)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous reading assessments and 1990. The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

TRENDS IN EXPOSURE TO READING IN THE HOME FROM 1971 TO 1990

A second factor thought to shape students' reading proficiency is the extent to which their home environment provides opportunities for diverse reading. Students participating in each NAEP assessment since 1971 have been asked whether they have access to newspapers, magazines, books, and encyclopedias at home. Long-term trends in the number of reading materials in the home reveal some interesting changes, as shown in TABLE 9.2.

At all three ages, the percentage of students assessed in 1990 who reported four types of reading materials declined signficantly since 1971. The changing relationships between students' reading proficiency and the availability of reading materials in the home is noteworthy. While the average reading proficiency of students with access to four kinds of reading materials remained essentially unchanged from 1971 to 1990 at all three ages, the average proficiency of students with zero to two kinds of reading materials at home and 13- and 17-year-olds with access to three kinds of materials at home rose significantly across the 19-year period.

TABLE 9.2
Trends in the Number of Materials in the Home, 1971 to 1990

		AGE 9		AGE 13		AGE 17	
Numbers of Types of Materials in the Home	**Year**	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**
0-2	**1990**	36 (1.2)	196 (1.4)	21 (0.8)	240 (1.6)	15 (0.7)	271 (2.4)
	1971	28 (0.8)*	186 (1.0)*	17 (0.6)*	227 (1.3)*	11 (0.6)*	246 (1.8)*
3	**1990**	34 (0.9)	211 (1.8)	32 (0.6)	255 (1.1)	29 (0.7)	286 (1.5)
	1971	33 (0.4)	208 (1.0)	25 (0.5)*	249 (0.9)*	22 (0.5)*	274 (1.4)*
4	**1990**	29 (1.0)	226 (1.9)	47 (1.0)	266 (0.9)	55 (0.9)	299 (1.1)
	1971	39 (0.9)*	223 (0.9)	58 (1.0)*	267 (0.7)	67 (0.9)*	296 (1.0)

* Statistically significant difference from 1990 as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous reading assessments and 1990. The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

TRENDS IN THE EXTENT OF READING IN THE HOME FROM 1984 TO 1990

To further investigate the extent to which students' home environment supports reading, NAEP asked 13- and 17-year-old students to report how often the people they lived with actually read newspapers, magazines, and books. Students were grouped in three categories: those who, on average, reported that the persons they lived with never read newspapers, magazines, and books, or read these materials very infrequently (i.e, yearly or monthly); those who reported that the individuals they lived with read these materials on a weekly basis; and those who said they lived with someone who read these materials on a daily basis. TABLE 9.3 displays the percentage of students in each category and their average proficiency.

TABLE 9.3

Trends in the Extent of Reading in the Home, 1984 to 1990

		AGE 13		AGE 17	
Extent of Reading in the Home	**Year**	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**
Never/Yearly/Monthly	1990	19 (1.6)	240 (3.3)	15 (1.5)	270 (5.9)
	1984	16 (1.0)	245 (2.0)	14 (0.8)	268 (2.3)
Weekly	1990	42 (1.9)	258 (2.8)	45 (1.9)	290 (2.6)
	1984	43 (1.1)	259 (2.0)	44 (1.1)	288 (1.5)
Daily	1990	39 (1.7)	263 (2.8)	40 (2.0)	297 (3.0)
	1984	41 (0.9)	263 (1.8)	42 (1.4)	292 (1.6)

* Statistically significant difference from 1990 as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous reading assessments and 1990. The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value of the whole population is within plus or minus two standard errors of the estimate for the sample.

There appear to have been no significant changes across time at any age in the extent of reading in the home, or in the relationship between this variable and students' reading achievement. At both ages, students who reported that the individuals they lived with were frequent readers of books, newspapers, and magazines tended to register the highest average reading proficiency.

TRENDS IN TIME SPENT ON HOMEWORK FROM 1984 TO 1990 In past assessments in reading and other subject areas, NAEP found that the amount of time students spend on homework tends to be related positively to their performance. TABLE 9.4 presents students' responses to questions asked about the average amount of time spent on homework each day.[54] In 1990, the positive relationship between reading proficiency and amount of time spent on homework was evident at age 17, and this relationship has not changed across the last decade.

At all three ages, the percentage of students who reported having no assigned homework stayed about the same between earlier assessments and 1990. Nine-year-old students assessed in 1990 were as likely as their counterparts assessed in 1984 to report that they did at least some homework each day (less than one hour). Students in this age

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[54] It should be noted that these questions referred to students' homework in general rather than to their reading homework in particular.

TABLE 9.4

Trends in the Amount of Time Spent on Homework, 1984 to 1990

Amount of Homework	Year	AGE 9		AGE 13		AGE 17	
		Percent	Average Proficiency	Percent	Average Proficiency	Percent	Average Proficiency
None	1990	31 (1.9)	208 (1.5)	21 (1.1)	252 (1.9)	23 (1.0)	274 (2.0)
	1984	36 (1.3)	213 (0.9)	23 (0.8)	254 (0.8)	22 (0.9)	276 (0.7)
Didn't Do Assigned Homework	1990	5 (0.4)	187 (4.8)	5 (0.5)	244 (3.2)	13 (0.6)	288 (2.3)
	1984	4 (0.3)	199 (2.1)	4 (0.2)	247 (1.7)	11 (0.3)*	287 (1.2)
Less than 1 Hour	1990	46 (1.6)	214 (1.7)	37 (0.9)	258 (1.1)	28 (0.9)	291 (1.6)
	1984	42 (1.0)	218 (0.7)	36 (0.7)	261 (0.6)	26 (0.4)	290 (0.8)
1-2 Hours	1990	12 (0.6)	214 (2.8)	28 (1.0)	265 (1.6)	25 (0.7)	300 (1.4)
	1984	13 (0.5)	216 (1.3)	29 (0.5)	266 (0.7)	27 (0.5)	296 (0.8)
More than 2 Hours	1990	6 (0.5)	194 (3.5)	8 (0.5)	262 (2.2)	12 (0.7)	307 (2.6)
	1984	6 (0.2)	201 (1.8)	9 (0.3)	265 (1.2)	13 (0.6)	303 (1.1)

* Statistically significant difference from 1990 as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous reading assessments and 1990. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

group who stated that they spent up to an hour or from one to two hours on homework each day displayed higher reading proficiency, on average, than did students who reported that they did not do the work assigned.

In each assessment year, the percentage of 17-year-olds who reported not doing their homework was higher than that of students at ages 9 and 13. The percentage of high school students assessed in 1990 who reported spending various amounts of time on homework stayed essentially the same as in 1984. However, a significantly higher percentage of 17-year-olds in 1990 than in 1984 reported not doing assigned homework .

TRENDS IN ENGAGEMENT IN READING FROM 1984 TO 1990

To gather information on the kinds of materials students read either in or out of school, NAEP asked 9-, 13-, and 17-year-olds in 1984 and 1990 how often they read stories or novels, newspapers, and magazines. Their responses were used to create a composite variable summarizing the extent to which students read, on average, all of these materials. Students were grouped in three categories: those who never read stories or novels, newspapers, and magazines, or who reported doing so only infrequently (i.e, yearly or monthly); students who read these materials on a weekly basis; and students who read these materials daily. As shown in TABLE 9.5, the percentage of students in each category varies across the ages.

There were no significant shifts across time in students' responses to questions about their reading of books, newspapers, and magazines, aside from an increase in the percentage of 9-year-olds who reported a low amount of reading. The relationship between the amount of reading students reported and their reading proficiency also stayed virtually the same across time at each age level. Among the 13- and 17-year-olds assessed, those reading stories, newspapers, and magazines on a frequent basis (daily) exhibited higher proficiency in both 1984 and 1990 than those reading infrequently (yearly, monthly).

TABLE 9.5

Trends in Reading Books, Newspapers, and Magazines, 1984 to 1990

		AGE 9		AGE 13		AGE 17	
Frequency of Reading	**Year**	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**
Yearly/ Monthly	1990	66 (2.0)	205 (2.7)	32 (1.9)	252 (2.7)	24 (1.9)	274 (3.9)
	1984	59 (1.5)*	207 (1.6)	30 (1.5)	244 (1.7)	20 (1.0)	270 (2.0)
Weekly	1990	25 (1.9)	215 (3.6)	51 (2.1)	260 (2.7)	52 (2.4)	294 (2.1)
	1984	31 (1.5)	220 (2.5)	49 (1.1)	261 (1.6)	53 (1.2)	288 (1.5)
Daily	1990	9 (1.2)	216 (8.9)	18 (1.3)	269 (3.1)	24 (1.6)	295 (4.8)
	1984	11 (0.9)	211 (3.8)	21 (1.1)	269 (2.2)	27 (1.3)	299 (1.9)

* Statistically significant difference from 1990 as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous reading assessments and 1990. The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

As indicated in TABLE 9.6, there has been little change across time at any age level in the percentage of students who read for fun on their own time. Across the age groups, students who frequently read for fun were likely to have the highest proficiency, and those who never read for fun had the lowest. Approximately one-tenth of the students at each age stated that they never read for pleasure.

TABLE 9.6

Trends in Amount of Time Spent Reading for Fun, 1984 to 1990

		AGE 9		AGE 13		AGE 17	
Amount of Reading	**Year**	**Percent**	**Average Proficiency**	**Percent**	**Average Proficiency**	**Percent**	**Average Proficiency**
Daily	1990	54 (1.8)	215 (2.3)	35 (1.7)	269 (2.9)	31 (2.1)	304 (2.9)
	1984	53 (1.0)	214 (1.1)	35 (1.0)	264 (1.4)	31 (0.8)	297 (1.5)
Weekly	1990	25 (1.3)	211 (3.0)	32 (1.7)	255 (3.6)	31 (2.0)	294 (3.7)
	1984	28 (0.8)	212 (1.7)	35 (1.2)	255 (1.4)	34 (1.1)	290 (1.7)
Monthly	1990	6 (0.6)	210 (5.5)	13 (1.3)	251 (4.3)	16 (1.3)	288 (4.2)
	1984	7 (0.6)	204 (3.3)	14 (0.8)	255 (2.1)	17 (0.5)	290 (1.8)
Yearly	1990	4 (0.6)	198 (7.2)	9 (1.1)	245 (4.3)	12 (1.4)	280 (5.6)
	1984	3 (0.3)	197 (4.2)	7 (0.5)	252 (3.6)	10 (0.5)	280 (2.7)
Never	1990	12 (0.9)	192 (3.5)	11 (1.3)	247 (5.0)	10 (1.3)	266 (6.8)
	1984	9 (0.5)*	198 (2.7)	9 (0.6)	239 (2.5)	9 (0.6)	269 (2.4)

* Statistically significant difference from 1990 as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous reading assessments and 1990. (No significance test is reported when the percentage of students is either > 95.0 or < 5.0.) The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

To evaluate their engagement in other reading-related pursuits, students were also asked how often they engaged in such activities as telling a friend about a good book, taking books out of the library, spending their own money on books, or reading more than one book by an author they particularly liked. TABLE 9.7 presents the percentage of students at each age level who reported ever engaging in any or all of these four activities.

In each assessment, students' engagement in the kinds of reading activities mentioned appeared to be about the same across the age groups. Thus, 13- and 17-year-olds were as likely as 9-year-olds were to engage in all four activities — telling a friend about a good book, taking books out of the library, spending their own money on books, and reading more than one book by an author they liked. All in all, there was little change across time in students' response patterns. However, in 1990, significantly more 13-year-olds reported engaging in zero or one of these reading-related activities than in 1984.

TABLE 9.7

Trends in Engagement in Reading-Related Activities, 1984 to 1990

		AGE 9		AGE 13		AGE 17	
Number of Activities	**Year**	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**	**Percent Students**	**Average Proficiency**
0-1	1990	10 (0.9)	197 (3.7)	16 (1.4)	244 (4.2)	22 (2.1)	279 (4.2)
	1984	10 (0.5)	205 (2.5)	12 (0.8)*	242 (2.1)	17 (0.8)	271 (1.7)
2	1990	17 (1.2)	205 (4.9)	14 (1.2)	245 (3.4)	12 (1.5)	283 (4.4)
	1984	16 (0.8)	208 (1.7)	14 (0.8)	246 (2.6)	14 (0.6)	282 (2.1)
3	1990	27 (1.4)	210 (3.5)	23 (1.5)	258 (3.1)	21 (1.5)	286 (4.5)
	1984	31 (1.0)	211 (1.8)	25 (0.9)	255 (1.5)	23 (0.7)	289 (1.8)
4	1990	46 (1.4)	218 (2.3)	47 (2.0)	266 (2.4)	45 (1.9)	305 (2.8)
	1984	44 (1.0)	216 (1.5)	49 (1.1)	264 (1.3)	47 (1.3)	298 (1.6)

* Statistically significant difference from 1990 as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between previous reading assessments and 1990. The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

SUMMARY The data on students' reading activities and experiences, both at school and at home, present a complex picture. However, more students at ages 13 and 17 tended to report reading in language arts. It also appeared that students were slightly less likely to have access to a variety of reading materials in the home, although the amount of reading done by the individuals with whom students lived did not change across time.

In 1990, students at all ages seemed to be spending about the same amount of time on homework as did students participating in the previous five NAEP assessments. As in previous NAEP assessments in reading and other subject areas, positive relationships existed between students' proficiency and the amount of time spent on homework.

Students at all three ages who reported reading books, newspapers, and magazines more often also displayed higher reading proficiency. However, the percentage of students who reported frequent reading of books, newspapers, and magazines did not change from 1984 to 1990.

There were no changes across time in the percentages of students who read for fun, and in each assessment approximately one-tenth of the students in each age group reported that they never read for pleasure on their own. Similarly, across assessments from 10 to 22 percent of the students at ages 9, 13, and 17 stated that they never or rarely engaged in such reading-related activities as telling a friend about a good book, taking books out of the library, spending their own money on books, or reading more than one book by an author they liked.

In general, the findings suggest that reading is not a frequent activity for many students. However, it appears that about the same number of students in 1990 were engaging in reading activities as those assessed in 1984.

WRITING
1984 to 1990

PART IV

TRENDS IN WRITING ACHIEVEMENT FROM 1984 TO 1990

INTRODUCTION

This section of the report is based on three national assessments of writing performance conducted during the school years ending in 1984, 1988, and 1990. In each of the assessments, nationally representative samples of students in grades 4, 8, and 11 — approximately 30,000 students in all — responded to a series of writing tasks. To assess the informative, persuasive, and imaginative writing performance of the nation's students and to track changes in performance across time, the 1990 assessment included a set of 12 writing tasks that had been administered in 1984 and 1988. Thus, the same tasks were given to nationally representative samples of students at three different points in time. Students also were asked to provide demographic information and to answer a brief questionnaire about their writing experiences and instruction.

The past 20 years have seen a dramatic shift in the focus of writing research and practice away from the text and toward the writer. Our understanding of the processes involved in writing and of the effective ways to teach writing have evolved during this time.[55] Writing is now seen as a recursive process involving invention and brainstorming, drafting and composing, reflecting and revising, and evaluating and editing. Research has shown that students learn to write well by frequent practice and by developing an understanding of the dynamics of the composing process.[56] Research also indicates that students are more likely to write competently when they routinely write in all subject areas and write a variety of types of texts.[57]

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[55] Janet Emig, *The Composing Processes of Twelfth Graders* (Urbana, IL: National Council of Teachers of English. NCTE Research Rep. No. 13, ERIC Document No. ED 058205, 1971).
Donald H. Graves, *Writing: Teachers and Children at Work* (Portsmouth, NH: Heinemann Educational Books, 1983).

Because competence in one type of writing does not necessarily go hand in hand with competence in another, the 1984, 1988, and 1990 assessments were designed to examine students' abilities to engage in three types of writing: informative, persuasive, and imaginative.[58] For example, students were asked to complete brief, informative descriptions, reports, and analyses; to write persuasive letters and arguments; and to invent their own stories. The resulting papers were evaluated on the basis of the students' success in accomplishing the specific purpose of each writing task (as measured by primary trait scoring), their relative writing fluency (as measured by holistic scoring), and their mastery of the conventions of written English (as measured by their spelling, punctuation, and grammar).

SUMMARY OF PROCEDURES: 1984, 1988, AND 1990

To examine trends in writing achievement from 1984 to 1990, one set of analyses, based on primary trait scoring, was conducted that focused on the writer's effectiveness in accomplishing each task.[59] Primary trait scoring is designed to be sensitive to the writer's understanding of the audience as well as to the inclusion of specific features needed to accomplish the specific purpose of that task. The primary trait scoring criteria, while specific to each writing prompt, also defined five levels of task accomplishment: not rated, unsatisfactory, minimal, adequate, and elaborated. General definitions of these levels are provided on the following page.

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[56] James Britton, *Prospect and Retrospect: Selected Essays of James Britton*, Gordon M. Pradl, editor (Montclair, NJ: Boynton/Cook Publishers, Inc. 1982).

[57] George Hillocks, Jr., *Research on Written Composition: New Directions for Teaching* (Urbana, IL: ERIC Clearinghouse on Reading and Communication Skills, 1986).

[58] Ian Pringle and Aviva Freedman, *A Comparative Study of Writing Abilities in Two Modes at the Grade 5, 8, and 12 Levels* (Toronto, Ontario: The Minister of Education, Ontario, 1985).

[59] Richard Lloyd-Jones, "Primary Trait Scoring," in *Evaluating Writing: Describing, Measuring, Judging*, Charles R. Cooper and Lee Odell, editors (Urbana, IL: NCTE, 1977).

LEVELS OF TASK ACCOMPLISHMENT

SCORE	
LEVEL 4	**ELABORATED** Students providing elaborated responses went beyond the essential, reflecting a higher level of coherence and providing more detail to support the points made.
LEVEL 3	**ADEQUATE** Students providing adequate responses included the information and ideas necessary to accomplish the underlying task and were considered likely to be effective in achieving the desired purpose.
LEVEL 2	**MINIMAL** Students writing at the minimal level recognized some or all of the elements needed to complete the task but did not manage these elements well enough to assure that the purpose of the task would be achieved.
LEVEL 1	**UNSATISFACTORY** Students who wrote papers judged as unsatisfactory provided very abbreviated, circular, or disjointed responses that did not even begin to address the writing task.
LEVEL 0	**NOT RATED** A small percentage of the responses were blank, indecipherable, completely off task, or contained a statement to the effect that the student did not know how to do the task; these responses were not rated.

The samples of writing generated by students in the assessments represent their ability to produce first-draft writing on demand in a relatively short time and under less than ideal conditions; thus, the guidelines for evaluating task accomplishment are designed to reflect these constraints and do not require a finished performance. Because primary trait scoring is based on established criteria, it is theoretically possible for all papers to be rated at the highest level on a straightforward task, or for all papers to be scored at the lowest levels on a particularly difficult task. Overall, the primary trait scoring procedure provides the best assessment of students' ability to perform each task.

A second set of analyses, based on general impression or holistic scoring, focused on the writer's fluency in responding to each task relative to the performance of other students at that grade level.[60] In holistic scoring, readers do not make separate judgments about specific aspects of writing, but instead consider the overall effect, rating each paper on a six-point scale on the basis of the paper's general fluency. Unlike primary trait scores, the average score for a set of papers rated holistically will generally fall near the midpoint of this scale. Thus, while primary trait scoring permits year-to-year and grade-level to grade-level comparisons on specific criteria, holistic scoring permits year-to-year comparisons of relative fluency at each grade.

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[60] Charles R. Cooper, "Holistic Evaluation of Writing," in *Evaluating Writing: Describing, Measuring, Judging* Charles R. Cooper and Lee Odell, editors, (Urban, IL: National Countil of Teachers of English, 1977).

The final set of analyses, applied to a subset of the papers focused on the mechanics of students' writing. Students' mastery of the sentence-level and word-level conventions of English, as well as their use of correct punctuation were examined.[61] (See Procedural Appendix for the scoring scheme.)

NAEP reports the performance of groups of students, not individuals. The results in this report include measures of average writing performance for groups of students and the percentages of students responding to the assessment tasks at different levels of success. Because these averages and the percentages are based on samples, they are necessarily estimates. Like all estimates based on surveys, they are subject to sampling error. NAEP uses a complex procedure (the jackknife methodology) to compute standard errors that estimate the sampling error and other random error associated with observed assessment results, and provides this information with the assessment results. Also, this report adheres to a standard convention whereby trend differences are noted with an asterisk if they are statistically significant at the .05 level.

The first chapter in Part IV, Chapter Ten, summarizes trends in average task accomplishment for the nation and various demographic subpopulations, offering a global view of the assessment results. Chapter Eleven describes student performance on the informative, persuasive, and imaginative writing tasks included in the writing trend assessments, based on the results of the primary trait and holistic analyses. Trends in students' grammar, punctuation, and spelling are also discussed in Chapter Eleven. Chapter Twelve presents factors that appear to be related to writing performance, such as students' instructional experiences and characteristics of their home environment.

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[61] Mina P. Shaughnessy, *Errors and Expectations: A Guide for the Teacher of Basic Writing* (New York: Oxford University Press, 1977).

CHAPTER TEN

TRENDS IN WRITING ACHIEVEMENT FOR THE NATION AND DEMOGRAPHIC SUBPOPULATIONS

NATIONAL TRENDS IN WRITING ACHIEVEMENT FROM 1984 TO 1990

NAEP has conducted trend writing assessments in 1984, 1988, and 1990, each one involving nationally representative samples of fourth, eighth, and eleventh graders. At each grade level and in each assessment, NAEP presented students with the same set of writing tasks or prompts. Although students at each grade responded to the same six prompts in each assessment, the tasks across grades represent partially overlapping, but somewhat different sets of prompts. As explained in more detail in the introduction, student responses to each prompt were evaluated according to task accomplishment where 0=Not rated, 1=Unsatisfactory, 2=Minimal, 3=Adequate, and 4=Elaborated.

To compare overall writing performance over time for students at each of the three grades, NAEP has calculated the average achievement across the six tasks at that grade level for each assessment.[62] The averages were multiplied by 100 for ease of reporting, and the results are displayed in a metric that ranges from 0 to 400. Although this procedure provides results that are directly comparable from assessment to assessment within each grade, the results across grades are not directly comparable because some easier tasks were given to fourth graders and some more difficult tasks to eleventh graders. Thus, care should be taken in comparing results across grades.[63]

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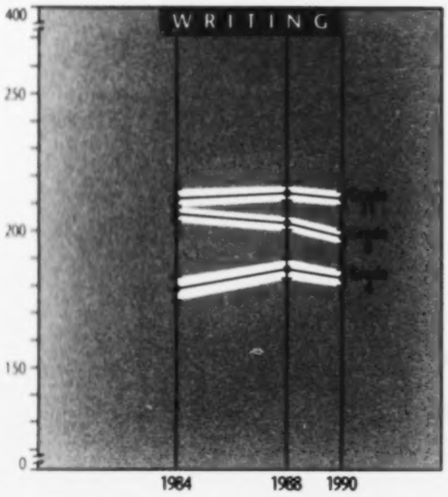
[62] To estimate average performance at each grade, NAEP first obtained the mean performance level for each task administered to that grade. The results presented in this chapter are the averages of those means (see the Procedural Appendix for further details).

The national results presented in FIGURE 10.1 show relatively consistent results across assessments, although there have been some changes during the six-year period from 1984 to 1990.

FIGURE 10.1
Trends in Average Writing Achievement for the Nation, 1984 to 1990



	1984	1988	1990
Grade 11	212(1.7)	214(1.4)	212(1.3)
Grade 8	206(1.4)*	203(1.3)*	198(1.3)
Grade 4	179(2.2)	186(1.8)	183(1.5)

Ī 95 percent confidence interval.

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 2 comparisons (each year compared to 1990). The standard errors of the estimated averages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

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[63] The results on tasks given to students at more than one grade are presented in Chapter 11.

FOURTH GRADERS. Average performance at grade four showed signs of improvement from 1984 to 1988, but the upward trend was not sustained in 1990. Thus, a comparison of fourth grade achievement from 1984 to 1990 reveals no significant changes. Essentially, from assessment to assessment, fourth graders have continued to respond to writing tasks with incomplete or undeveloped answers.

EIGHTH GRADERS. Eighth graders have shown declines in performance across the assessments to the extent that they were writing significantly more poorly, on average, in 1990 than in 1984. In addition, eighth graders' average achievement in 1990 remained at the minimal level, suggesting that, in responding to their prompts, they addressed the assigned task and developed ideas to some extent, but not fully.

ELEVENTH GRADERS. Performance at grade 11 remained essentially constant across the three assessments. In each assessment, on average, eleventh graders tended to provide papers characterized by minimal development in terms of the writing tasks required. However, in responding to the tasks, enough eleventh graders have written papers containing complete or elaborate development to maintain the group's average achievement 12 points above 200.

TRENDS IN WRITING ACHIEVEMENT FROM 1984 TO 1990

BY RACE/ETHNICITY Trends in average writing achievement for White, Black, and Hispanic students are summarized in FIGURE 10.2.[64] Changes in average writing performance for White students between 1984 and 1990 most closely resemble the national profile, with a significant decline at grade 8 and no significant changes at grades 4 or 11. In contrast, the average writing achievement of Black and Hispanic students remained relatively stable across time at all three grades. At grade 4, there was some increase in the performance of White students and Hispanic students between 1984 and 1990, but not at a significant level, while the average performance of Black students remained constant.

All groups, except Hispanic students, showed some decline in the eighth grade. White students' performance was down significantly from 1984 to 1990 and Black students' proficiency declined to a lesser degree, but the change was not significant. In the eleventh grade, the performance of White and Black students across the six-year period was constant. In comparison, Hispanic students in 1990 maintained the performance increase achieved between 1984 and 1988, although this increase was not statistically

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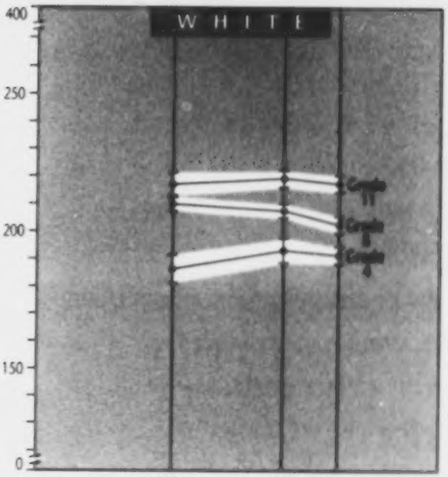
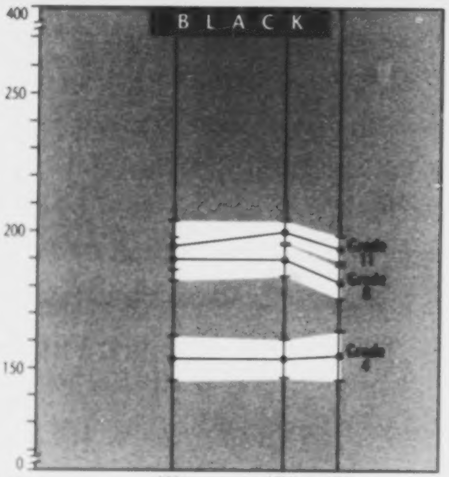
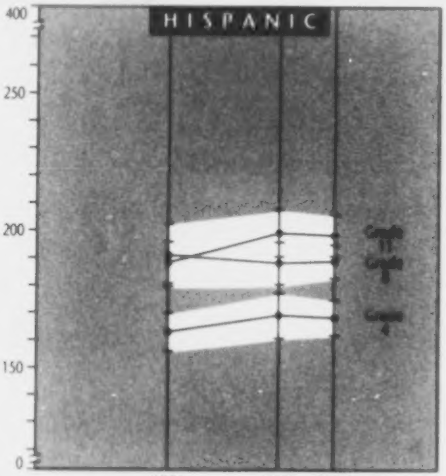
[64] For Asian/Pacific Islander students and American Indian students, the sample sizes were insufficient to permit reliable trend estimates.

FIGURE 10.2
Trends in Average Writing Achievement by Race/Ethnicity, 1984 to 1990





	1984	1988	1990	1984	1988	1990
Grade 11	**218(2.2)** 75(1.1)*	**219(1.6)** 74(0.1)*	**217(1.5)** 71(0.2)	**195(4.4)** 15(1.0)	**200(2.8)** 15(0.1)*	**194(2.3)** 16(0.2)
Grade 8	**210(1.6)*** 76(0.9)*	**207(1.3)*** 71(0.2)	**202(1.5)** 70(0.2)	**190(3.6)** 12(0.6)*	**190(3.4)** 15(0.2)	**182(2.8)** 15(0.2)
Grade 4	**186(2.6)** 71(0.9)	**193(2.1)** 70(0.2)	**191(1.6)** 70(0.3)	**154(4.3)** 15(0.6)	**154(3.6)** 15(0.2)	**155(4.8)** 15(0.3)



	1984	1988	1990
Grade 11	**188(3.9)** 8(0.6)	**199(4.2)** 8(0.1)*	**198(3.9)** 9(0.1)
Grade 8	**191(5.7)** 8(0.7)*	**188(3.8)** 10(0.1)	**189(3.0)** 10(0.2)
Grade 4	**163(3.5)** 11(0.7)	**169(4.4)** 11(0.1)	**168(3.4)** 11(0.2)

Note: Averages are in **bold face** type. For each age, the second row of data lists the percentages of students in the total population from each subgroup.

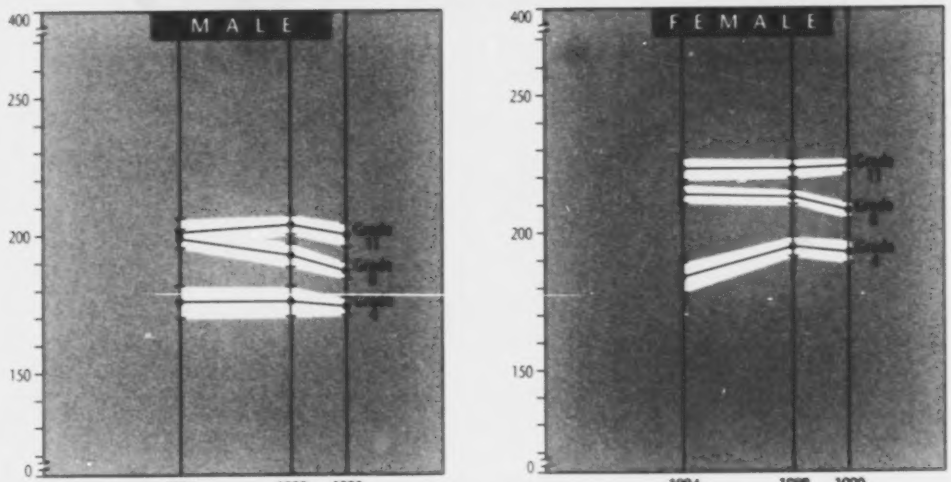
Ī 95 percent confidence interval.

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 2 comparisons (each year compared to 1990). The standard errors of the estimated averages and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages do not total 100 percent because Asian/Pacific Islander and American Indian student data were analyzed separately. For Asian/Pacific Islander students and American Indian students, the sample sizes were insufficient to permit robust trend estimates.

significant. The results indicate that, on average, the gap in writing performance between minority students and their White counterparts remained large.

TRENDS IN WRITING ACHIEVEMENT FROM 1984 TO 1990 BY GENDER FIGURE 10.3 summarizes average writing achievement results by gender. Between 1984 and 1990, the average writing performance of fourth-grade females increased significantly, while the performance of their male counterparts remained essentially the same.

FIGURE 10.3
Trends in Average Writing Achievement by Gender, 1984 to 1990



	1984	1988	1990	1984	1988	1990
Grade 11	**201(2.7)**	**204(1.9)**	**200(2.0)**	**223(2.0)**	**223(1.6)**	**224(1.4)**
	51(1.6)	47(1.5)*	51(0.8)	49(1.6)	53(1.5)*	49(0.8)
Grade 8	**199(1.8)***	**193(2.1)**	**187(1.6)**	**214(1.9)***	**213(1.4)**	**208(1.5)**
	51(1.2)	49(1.1)	51(0.9)	49(1.2)	51(1.1)	50(0.9)
Grade 4	**176(3.0)**	**176(2.8)**	**174(1.6)**	**184(2.6)***	**195(1.8)**	**193(2.2)**
	53(1.5)	51(0.9)	51(0.9)	47(1.5)	49(0.9)	49(0.9)

Note: Averages are in **bold face** type. For each age, the second row of data lists the percentages of students in the total population from each subgroup.

⌶ 95 percent confidence interval.

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 2 comparisons (each year compared to 1990). The standard errors of the estimated averages and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

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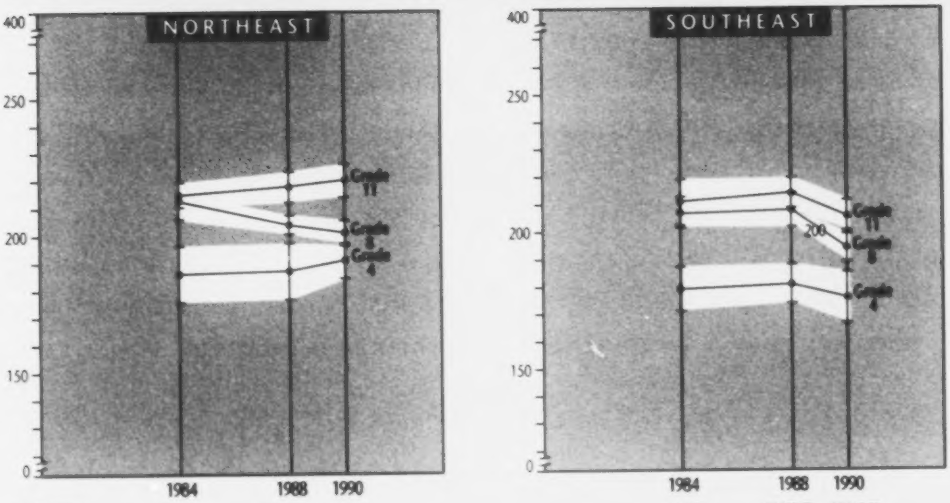
At grade 8, both males' and females' writing proficiency declined significantly between 1984 and 1990, while the writing performance of eleventh graders remained the same across the six-year period for both males and females. On average, females at all grades performed noticeably better than their male counterparts.

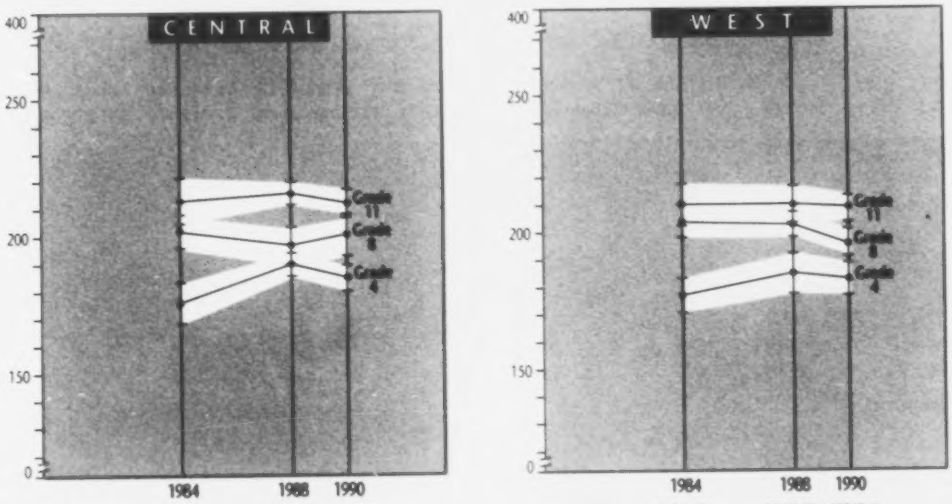
TRENDS IN WRITING ACHIEVEMENT FROM 1984 TO 1990 BY REGION FIGURE 10.4 summarizes students' overall performance by region. Although average achievement in the Northeast was at least as high, if not higher, in 1990 than in 1984 at grades 4 and 11, it declined significantly at grade 8 during the same period, similar to the pattern for the nation's eighth graders.

In the Southeast, average writing performance did not significantly change at grades 4 and 11, while eighth graders' performance in 1990 was significantly lower than in both 1984 and 1988. In the Central and Western regions, students showed fluctuations in performance across time, although none of the gains or losses was significant across the six-year period from 1984 to 1990.

FIGURE 10.4
Trends in Average Writing Achievement by Region, 1984 to 1990



	1984	1988	1990	1984	1988	1990
Grade 11	**215(2.2)** 26(0.8)*	**218(2.7)** 23(0.8)	**220(2.9)** 22(1.0)	**211(3.9)** 22(1.7)	**214(2.8)** 22(1.0)	**206(2.9)** 23(0.9)
Grade 8	**213(3.3)*** 23(1.0)	**204(1.8)** 23(2.2)	**201(2.2)** 23(1.0)	**207(2.8)*** 23(1.7)	**208(3.3)*** 24(1.3)	**194(2.5)** 25(1.1)
Grade 4	**186(5.3)** 21(0.8)	**187(5.2)** 23(1.6)	**191(3.2)** 22(1.0)	**179(4.0)** 25(1.3)	**181(3.5)** 26(1.7)	**176(4.7)** 24(1.2)



	1984	1988	1990	1984	1988	1990
Grade 11	**213(4.0)** 27(1.6)	**216(2.0)** 27(1.7)	**212(2.5)** 27(1.1)	**210(3.8)** 25(0.8)*	**210(3.2)** 28(1.1)	**209(2.4)** 28(0.9)
Grade 8	**202(3.0)** 27(1.6)	**197(3.5)** 26(2.2)	**201(3.8)** 23(0.7)	**204(3.0)** 26(0.8)*	**203(2.2)** 28(1.1)	**196(2.4)** 29(1.0)
Grade 4	**176(3.8)** 26(1.6)	**190(2.3)** 23(0.5)	**185(2.4)** 25(0.7)	**177(3.3)** 28(1.0)	**185(3.7)** 28(1.1)	**183(3.0)** 29(0.8)

Note: Averages are in **bold face** type. For each age, the second row of data lists the percentages of students in the total population from each subgroup.

⌶ 95 percent confidence interval.

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of 2 comparisons (each year compared to 1990). The standard errors of the estimated averages and percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

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TRENDS IN WRITING ACHIEVEMENT FROM 1984 TO 1990 BY TYPE OF COMMUNITY Trends in average writing achievement for students living in advantaged urban, disadvantaged urban, extreme rural, and other communities are presented in TABLE 10.1.

Advantaged urban students in grades 4, 8, and 11 showed only nonsignificant fluctuations in average performance across time. Between 1984 and 1990, fourth graders attending schools in disadvantaged urban communities appeared to show some decline in average writing achievement, but this decline was not statistically significant. Whereas eighth graders had relatively constant levels of average writing performance across the six-year period, eleventh graders in disadvantaged urban schools showed a significant increase in achievement between 1988 and 1990, which returned them to their 1984 level.

TABLE 10.1

Trends in Average Writing Achievement by Type of Community, 1984 to 1990

		GRADE 4		GRADE 8		GRADE 11	
Type of Community	**Year**	**Percent of Students**	**Average Achievement**	**Percent of Students**	**Average Achievement**	**Percent of Students**	**Average Achievement**
Advantaged Urban	1990	11 (2.1)	195 (4.8)	11 (1.9)	217 (3.5)	11 (1.8)	221 (5.2)
	1988	14 (2.3)	199 (6.1)	14 (3.7)	208 (3.0)	17 (4.0)	216 (3.7)
	1984	13 (2.4)	197 (3.8)	12 (2.6)	222 (5.7)	16 (2.6)	220 (4.7)
Disadvantaged Urban	1990	10 (3.0)	159 (6.8)	9 (1.5)	189 (3.2)	9 (2.2)	196 (4.4)
	1988	8 (2.6)	158 (4.8)	7 (2.1)	189 (2.7)	1 (0.8)*	177 (1.7)*
	1984	13 (2.0)	167 (4.1)	8 (1.3)	193 (4.3)	11 (2.1)	194 (4.4)
Extreme Rural	1990	10 (2.3)	186 (4.8)	10 (2.9)	200 (5.4)	13 (1.9)	211 (4.9)
	1988	10 (2.5)	185 (4.8)	6 (1.8)	205 (5.6)	7 (2.8)	215 (3.6)
	1984	7 (1.2)	154 (10.9)*	5 (1.1)	203 (4.8)	6 (1.2)*	206 (8.3)
Other	1990	70 (3.4)	184 (1.9)	70 (3.2)	195 (1.7)	67 (3.3)	212 (1.4)
	1988	68 (4.2)	186 (2.4)	73 (4.3)	203 (1.8)*	75 (5.0)	214 (1.5)
	1984	68 (2.1)	180 (2.8)	75 (2.5)	206 (1.6)*	67 (2.0)	214 (1.8)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of two comparisons (each year compared to 1990). Thus, alpha equals .025 for each comparison. The standard errors of the estimated averages and percentages appear in parentheses. It can be said with 95 percent certainty that, for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

Between 1984 and 1988, the average writing performance of fourth graders living in extreme rural communities increased significantly and this increase was maintained in 1990. Extreme rural students in grades 8 and 11 showed only minor fluctuations in average performance across this same time period.

TRENDS IN WRITING ACHIEVEMENT FROM 1984 TO 1990 BY PARENTS' HIGHEST LEVEL OF EDUCATION Table 10.2 presents the trends in average writing achievement by parents' highest level of education. The results indicate that, across all three assessments, the writing performance of fourth graders varied little for students regardless of their parents' highest level of education.

TABLE 10.2

Trends in Average Writing Achievement by Parents' Highest Level of Education, 1984 to 1990*

		GRADE 4		GRADE 8		GRADE 11	
Level of Education	**Year**	**Percent of Students**	**Average Achievement**	**Percent of Students**	**Average Achievement**	**Percent of Students**	**Average Achievement**
Didn't Finish High School	1990	5 (0.4)	169 (4.9)	8 (0.6)	192 (3.7)	9 (0.5)	190 (3.3)
	1988	5 (0.6)	158 (8.4)	9 (0.7)	195 (3.9)	8 (0.8)	202 (3.7)*
	1984	7 (0.6)	157 (6.0)	10 (0.8)*	196 (4.5)	11 (1.2)	200 (4.0)
Graduated High School	1990	19 (0.8)	183 (2.8)	33 (1.1)	195 (1.9)	30 (1.1)	205 (2.3)
	1988	18 (1.1)	183 (3.2)	32 (1.2)	198 (2.2)	30 (1.2)	211 (1.4)
	1984	20 (0.9)	171 (4.6)	35 (1.3)	203 (2.6)*	35 (2.1)*	207 (2.4)
Post-High School	1990	5 (0.4)	195 (5.9)	12 (0.7)	207 (2.7)	19 (0.6)	215 (2.3)
	1988	5 (0.4)	179 (6.6)	11 (0.6)	213 (3.2)	18 (0.8)	217 (2.4)
	1984	5 (0.4)	187 (5.5)	10 (0.8)	210 (5.2)	15 (0.9)*	218 (4.5)
Graduated College	1990	39 (1.5)	191 (2.3)	38 (1.5)	204 (2.0)	41 (1.4)	221 (1.8)
	1988	42 (1.4)	195 (2.2)	41 (1.5)	208 (2.3)	41 (1.8)	220 (2.1)
	1984	33 (1.4)*	193 (2.2)	36 (1.5)	215 (2.7)*	36 (1.7)	220 (3.0)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of two comparisons (each year compared to 1990). Thus, alpha equals .025 for each comparison. The standard errors of the estimated averaged and percentages appear in parentheses. It can be said with 95 percent certainty that, for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students do not total 100 percent because about one-third of the students at grade 4 and a smaller percentage at grades 8 and 11 reported that they did not know the educational level of either parent.

At grade 8, there was a statistically significant decline in writing achievement between 1984 and 1990 for students whose parents graduated from high school or college. Likewise, at grade 11, after remaining at approximately the same level from 1984 to 1988, the performance of students whose parents did not graduate from high school declined significantly between 1988 and 1990.

TRENDS IN WRITING ACHIEVEMENT FROM 1984 TO 1990 BY TYPE OF SCHOOL Students' average writing performance by the type of school they attended is shown in TABLE 10.3. The results show no statistically significant changes in average writing achievement for public or private school students across the six years at grades 4 and 11. At grade 8, there was a significant decline in achievement for students in public schools between 1984 and 1990. Although eighth graders attending private schools also showed some evidence of decline across the six-year period, the change was not statistically significant. These results closely resemble the national profile, with a significant decline at grade 8. Overall, the results indicate that the gap in writing performance between public and private school students remained large.

TABLE 10.3

Trends in Writing Achievement by Type of School, 1984 to 1990

		GRADE 4		GRADE 8		GRADE 11	
Type of School	**Year**	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**	**Percent of Students**	**Average Proficiency**
Public	1990	92 (1.8)	182 (1.7)	87 (1.9)	195 (1.3)	92 (1.7)	210 (1.3)
	1988	87 (2.9)	184 (1.7)	88 (2.7)	201 (1.6)*	86 (3.8)	213 (1.5)
	1984	87 (1.7)	178 (2.4)	87 (1.6)	204 (1.5)*	89 (1.5)	210 (1.8)
Private	1990	8 (1.3)	199 (3.8)	13 (1.4)	215 (3.7)	8 (1.3)	227 (8.3)
	1988	13 (2.0)	194 (6.3)	12 (2.2)	215 (2.4)	14 (3.5)	222 (3.2)
	1984	13 (1.4)	191 (4.7)	13 (1.3)	220 (3.2)	11 (1.4)	228 (4.7)

* Shows statistically significant difference from 1990, as determined by an application of the Bonferonni procedure, where alpha equals .05 per set of two comparisons (each year compared with 1990). Thus, alpha equals .025 for each comparison. The standard errors of the estimated averages and percentages appear in parentheses. It can be said with 95 percent certainty that, for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 due to rounding.

SUMMARY The results of NAEP's analysis of trends in average writing achievement from 1984 to 1990 reveal few shifts. There were no statistically significant changes in overall writing performance at grades 4 and 11, while the average performance of eighth-grade students dropped significantly. In examining the achievement trends for various subpopulations, it appears that performance declined among White students, males and females, students from the Northeast and Southeast, and students from public schools between 1984 and 1990 at grade 8.

In addition, female students showed a significant increase in writing performance at grade 4. Changes in performance for Black and Hispanic students were not statistically significant. Differences in average performance between subgroups remained large at all three grade levels in 1990, with females outperforming males and White students outperforming their Black and Hispanic counterparts. Students in private schools outperformed their counterparts in public schools, those in advantaged urban schools demonstrated higher average achievement than those attending schools in disadvantaged urban areas, and students whose parents had higher levels of education performed better than students whose parents had lower levels of education.

CHAPTER ELEVEN

TRENDS IN ASPECTS OF WRITING ACHIEVEMENT

Although the overall trends in writing achievement suggest few changes in performance during the 1980s, there were some differences between 1984 and 1990 in students' responses to particular writing tasks. This chapter explores trends in students' responses to the informative, persuasive, and narrative writing tasks they were given. In addition, to examine trends in students' ability to adhere to the conventions of written English, one task at each grade was selected for a detailed analysis of writing mechanics, including spelling, word choice, punctuation, and syntactical errors. The results of this study also are presented here.

NATIONAL TRENDS IN INFORMATIVE WRITING ACHIEVEMENT FROM 1984 TO 1990

Informative writing is used to convey ideas — to inform others about facts, feelings, or procedures. It can involve simple retelling or reporting as well as more complex analyses or generalizations about experiences or knowledge. We use informative writing when composing a letter, describing a trip we have taken, integrating lecture notes into a written report, and generalizing about lessons we have learned. Informative writing serves many purposes in meeting everyday as well as academic goals and can involve straightforward as well as highly complex thinking.[65]

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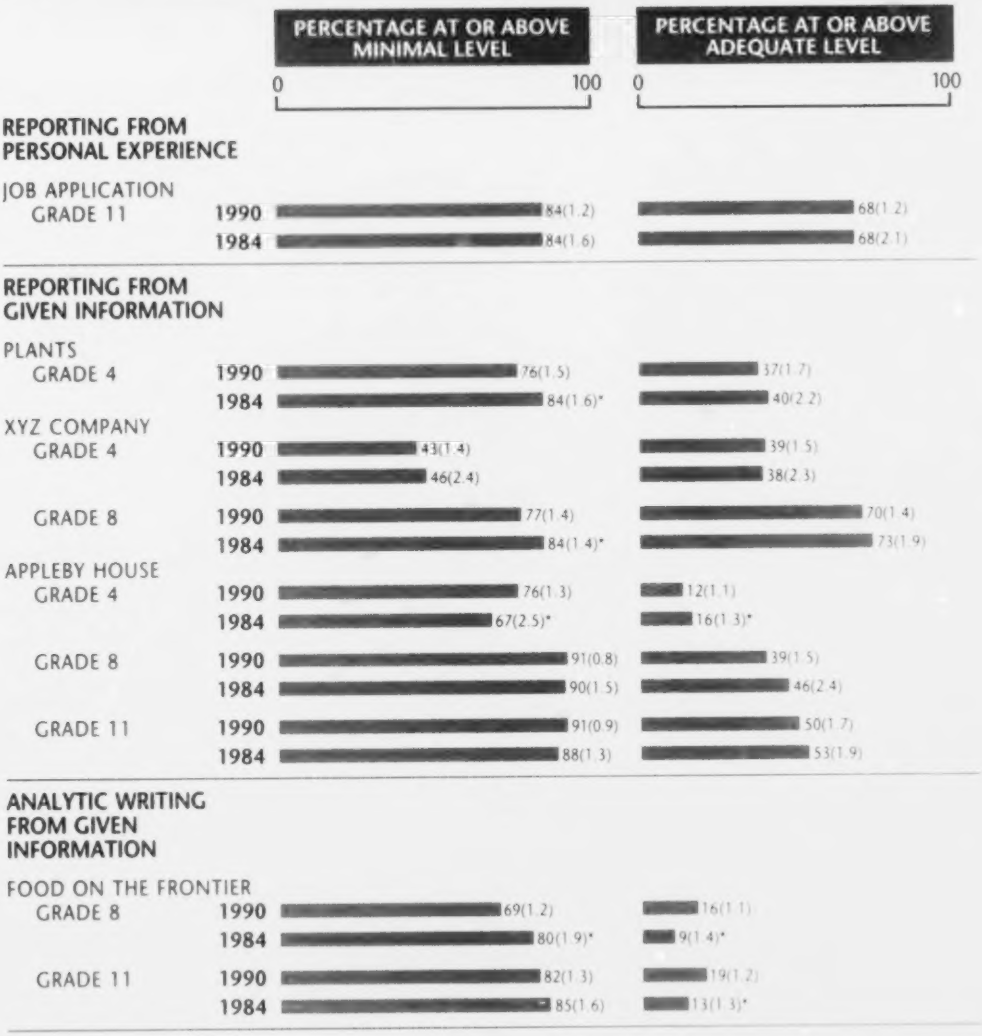
[65] James Britton, *Prospect and Retrospect: Selected Essays of James Britton*, Gordon M. Pradl, editor (Montclair, NJ: Boynton/Cook Publishers, Inc., 1982).

Of the five informative writing tasks included in the assessment of trends, one required that students write reports based on their personal experience, three required that they write reports based on given information, and one required that they write a report based on an analysis of given information. Together, these tasks reflect some of the diversity of purposes for which informative writing is undertaken.

FIGURE 11.1 presents data on the percentage of students who performed at or above the minimal and adequate levels of accomplishment for each informative task included in the 1984 and 1990 assessments.

FIGURE 11.1
Trends in Informative Writing at Grades 4, 8, And 11

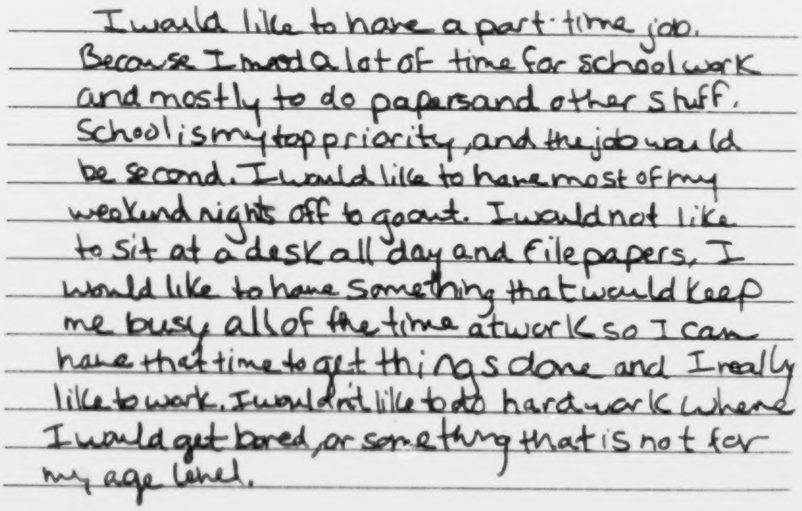


* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between each of the previous writing assessments and 1990. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

"Job Application" required eleventh-grade students to provide a brief description of a desirable summer job and to summarize their previous experiences or qualifications for it.

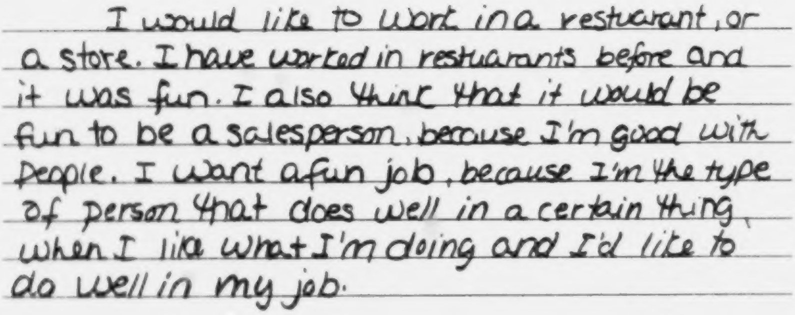
More eleventh graders provided adequate or better responses to this task than to any other informative task they were assigned. In both 1984 and 1990, 68 percent of the eleventh graders provided at least an adequate description of their job-related experiences and 84 percent provided a description that was judged minimal or better.

As reported in the Data Appendix, in both 1984 and 1990, approximately 14 percent of the eleventh graders provided unsatisfactory responses that did not present any details about the type of job desired, and about 16 percent of the responses from both years were rated as minimal. They provided some detail, but created no organizational framework for the reader to use to fit the parts together. These responses mentioned the kind of job desired, but did not describe relevant hobbies, interests, or past employment. The following student writing sample is typical of the papers rated as minimal.



I would like to have a part-time job.
Because I need a lot of time for schoolwork
and mostly to do papers and other stuff.
School is my top priority, and the job would
be second. I would like to have most of my
weekend nights off to go out. I would not like
to sit at a desk all day and file papers. I
would like to have something that would keep
me busy all of the time at work so I can
have that time to get things done and I really
like to work. I wouldn't like to do hard work where
I would get bored, or something that is not for
my age level.

Responses judged as adequate contained some information about the job desired and presented some relevant background information appropriate to the job. Approximately 65-67 percent of the eleventh graders' papers received an "adequate" rating. The following example is typical of the adequate responses. In contrast, the most successful papers — rated as "elaborated"— provided a full description within a cohesive framework. In these papers, students described the desired job as well as their qualifications and experience, and went beyond the basic elements required in an effort to "sell" themselves. However, fewer than 3 percent of the papers in both 1984 and 1990 were rated as elaborated.



I would like to work in a restuarant, or a store. I have worked in restuarants before and it was fun. I also think that it would be fun to be a salesperson, because I'm good with people. I want a fun job, because I'm the type of person that does well in a certain thing, when I like what I'm doing and I'd like to do well in my job.

REPORTING FROM GIVEN INFORMATION

"Plants" required fourth-grade students to summarize a science experiment depicted in a series of pictures showing different stages of a plant's growth.

"XYZ Company" required fourth- and eighth-grade students to complete a letter explaining that a previously ordered T-shirt had not been received and proposing a course of action.

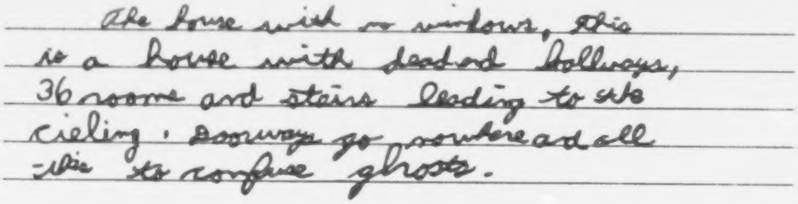
"Appleby House" required fourth, eighth, and eleventh graders to write a newspaper article based on notes they were given about an unusual haunted house.

In both 1984 and 1990, there were variations at each grade level in students' performance on the informative tasks that involved reporting from given information. Overall, in response to the "Plants" task, significantly fewer students wrote papers rated as minimal or better in 1990 than in 1984. As reported in the Data Appendix, 84 percent of the fourth graders in 1984 wrote at least a minimal description of a plant's growth stages and 40 percent wrote responses that were judged adequate. In 1990, only 76 percent wrote at least a minimal paper and 37 percent wrote responses rated as adequate.

The XYZ Company task permitted a comparison across grades as well as across time. In both 1984 and 1990, the percentage of minimal and adequate responses to this task rose, as expected, between grade 4 and grade 8. There was no significant change across time in fourth graders' performance on this item, while at the eighth-grade level, the percentage of students writing at the minimal level or better declined significantly (from 84 percent to 77 percent). The percentage of fourth and eighth graders providing adequate responses, however, did not change significantly between 1984 and 1990.

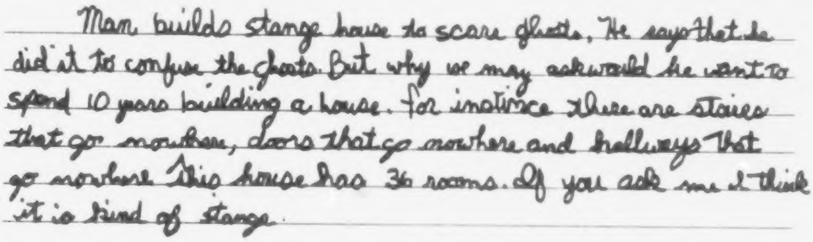
The Appleby House task was given at all three grades. While the quality of responses to this task at grades 8 and 11 did not change from 1984 to 1990, the percentage of fourth-grade students who wrote reports at or above the minimal level increased significantly (from 67 percent to 76 percent) from 1984 to 1990. However, the percentage performing adequately or better declined from 16 percent in 1984 to 12 percent in 1990.

In the Appleby House task, students were asked to reorganize the information provided and weave it into a report that would help the reader understand what the house is like. Some students simply enumerated the details in the sequence in which they were given without interrelating them. The following example is typical of the responses that were rated as minimal.



The house with no windows, this
is a house with deadend hallways,
36 rooms and stairs leading to the
cieling. doorways go nowhere and all
this to confuse ghosts.

In 1990, approximately half of the eleventh and 39 percent of the eighth graders, as well as nearly 12 percent of the fourth graders, provided reports judged as adequate. These responses tended to be brief, but presented information about the house in a report format, as illustrated by the following example. In contrast, the most successful reports emulated a newspaper article and linked critical details within a cohesive thematic frame in ways that both interested and informed the reader. However, only two percent of the papers in both the 1984 and 1990 assessments were judged to be elaborated.



Man builds stange house to scare ghosts. He says that he
did it to confuse the ghosts. But why we may ask would he want to
spend 10 years building a house. for instince there are staires
that go nowhere, doors that go nowhere and hallways that
go nowhere This house has 36 rooms. If you ask me I think
it is kind of stange.

ANALYTIC WRITING

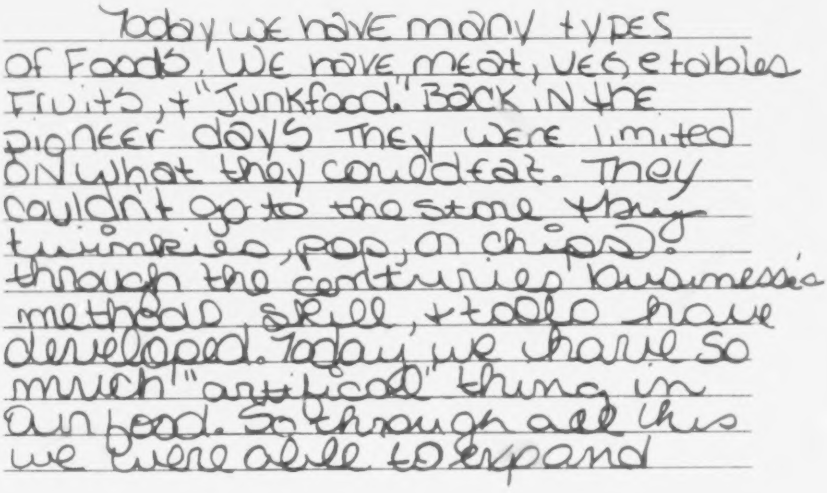
"Food on the Frontier" required eighth- and eleventh-grade students to read a social studies passage about frontier life and then to explain why modern-day food differs from frontier food.

Analytic writing is qualitatively different from the other kinds of informative writing that students were asked to perform. Reporting from personal experience and from given information involves simpler descriptions of what happened or what exists, while analytic writing calls for an explanation of why something happened as it did or how the parts fit together. In the 1984 assessment, relatively few students at grade 8 produced adequate or better pieces of analytic writing from given information. Overall, in 1984, 80 percent of the eighth graders and 85 percent of the eleventh graders appeared to have a grasp of the basic elements of analytic writing, yet only 9 percent and 13 percent, respectively, wrote responses at the adequate level or better.

The trend results reveal that a significantly higher percentage of eighth graders reached the adequate level in 1990, compared to 1984. At the eleventh grade, the percentage of students writing at or above the adequate level increased significantly from 13 to 19 percent. However, a majority of the high-school juniors assessed in 1990 — some 81 percent — still failed to write an adequate analytic paper.

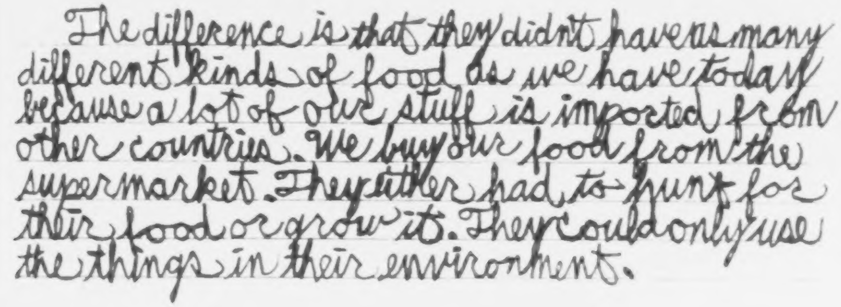
In 1990, 30 percent of the eighth graders and 17 percent of the eleventh graders provided unsatisfactory responses that either simply repeated information given in the passage or did not reflect an understanding of how to go about the task. At grade 8, this represented an increase in unsatisfactory papers compared to 1984.

In minimal responses to the Food on the Frontier task, such as the following, students tended to present comparisons but did not provide explanations about cause and effect. In 1990, 52 percent of students at grade 8 and 63 percent of students at grade 11 provided minimal responses.



Today we have many types
of Foods. We have meat, vegetables
Fruits, + "Junkfood." Back in the
pioneer days They were limited
ON what they couldeat. They
couldn't go to the store + buy
twinkies, pop, or chips.
through the centuries business's
methods, skill, + tools have
developed. Today we have so
much "artifical" thing in
our food. So through all this
we were able to expand

Papers judged as adequate provided some explanation for their comparisons, but were either uneven or sparse in their presentation. Sixteen percent of the eighth graders' papers and 18 percent of the eleventh graders' papers were rated as adequate. The following is typical of such responses. In contrast, the few most successful papers (only three percent even at age 17) went beyond the basic elements required, weaving their analyses into an organized and elaborated whole.



The difference is that they didn't have as many
different kinds of food as we have today
because a lot of our stuff is imported from
other countries. We buy our food from the
supermarket. They either had to hunt for
their food or grow it. They could only use
the things in their environment.

HOLISTIC ANALYSES Eighth- and eleventh-grade students' responses to the analytic task, Food on the Frontier, also were scored holistically, as a way of monitoring trends in writing fluency. As TABLE 11.1 shows, there was no significant change from 1984 to 1990 in the relative fluency of students' responses at either grade level. In both years, approximately 29 percent of the eighth graders and 41 percent of the eleventh graders wrote informative papers that were judged as "better" in overall fluency compared to the total pool of papers written by students at that grade level (i.e., that received scores of 4, 5, or 6). Overall, the distribution of holistic scores for the two grades was very similar across the two years.

TABLE 11.1

Trends in Fluency of Informative Writing: Holistic Ratings for "Food on the Frontier" Task

	PERCENTAGE OF STUDENTS			
	GRADE 8		GRADE 11	
Holistic Rating	**1984**	**1990**	**1984**	**1990**
0	1 (0.2)	1 (0.4)	1 (0.2)	1 (0.3)
1	6 (0.6)	7 (0.9)	4 (0.4)	2 (0.5)
2	26 (1.1)	27 (1.3)	17 (0.8)	18 (1.3)
3	38 (0.8)	37 (1.5)	38 (1.4)	38 (1.5)
4	21 (0.8)	21 (1.2)	28 (1.1)	27 (1.2)
5	7 (0.5)	6 (0.7)	10 (0.9)	12 (1.0)
6	1 (0.3)	2 (0.5)	3 (0.5)	3 (0.5)
4, 5, or 6	29 (1.0)	29 (1.5)	41 (1.6)	41 (1.8)
Average Rating	2.9 (0.0)	2.9 (0.0)	3.3 (0.0)	3.3 (0.1)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between each of the previous writing assessments. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

NATIONAL TRENDS IN PERSUASIVE WRITING ACHIEVEMENT FROM 1984 TO 1990

Persuasive writing is primarily intended to influence — to change ideas or actions. It is used to convince others of a point of view or a course of action, to refute their arguments, and to defend certain positions or behaviors. Persuasive writing necessitates awareness of the characteristics of one's audience and of ways to influence them.[66] We use persuasive writing in informal notes when we wish to convince a friend to go to one restaurant rather than another, as well as in formal critical essays when we present a tightly structured argument defending our preferred interpretation of a classical play. In all types of persuasive writing, both formal and informal, the writer must take a point of view and support or defend it.

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[66] William F. Brewer, "Literary Theory, Rhetoric, and Stylistics: Implications for Psychology," in *Theoretical Issues in Reading Comprehension*, Rand J. Spiro, Bertram C. Bruce, and William F. Brewer, editors (Hillsdale, NJ: Lawrence Erlbaum Associates, 1980).

Of the six persuasive tasks administered, three involved writing to convince others to adopt a particular point of view and the other three involved writing to refute an opposing position. Together these tasks reflect the kinds of writing intended to influence others and bring about change. FIGURE 11.2 presents information on trends in the percentages of students at each grade who performed at or above the minimal and adequate levels for each persuasive task.

WRITING TO CONVINCE OTHERS

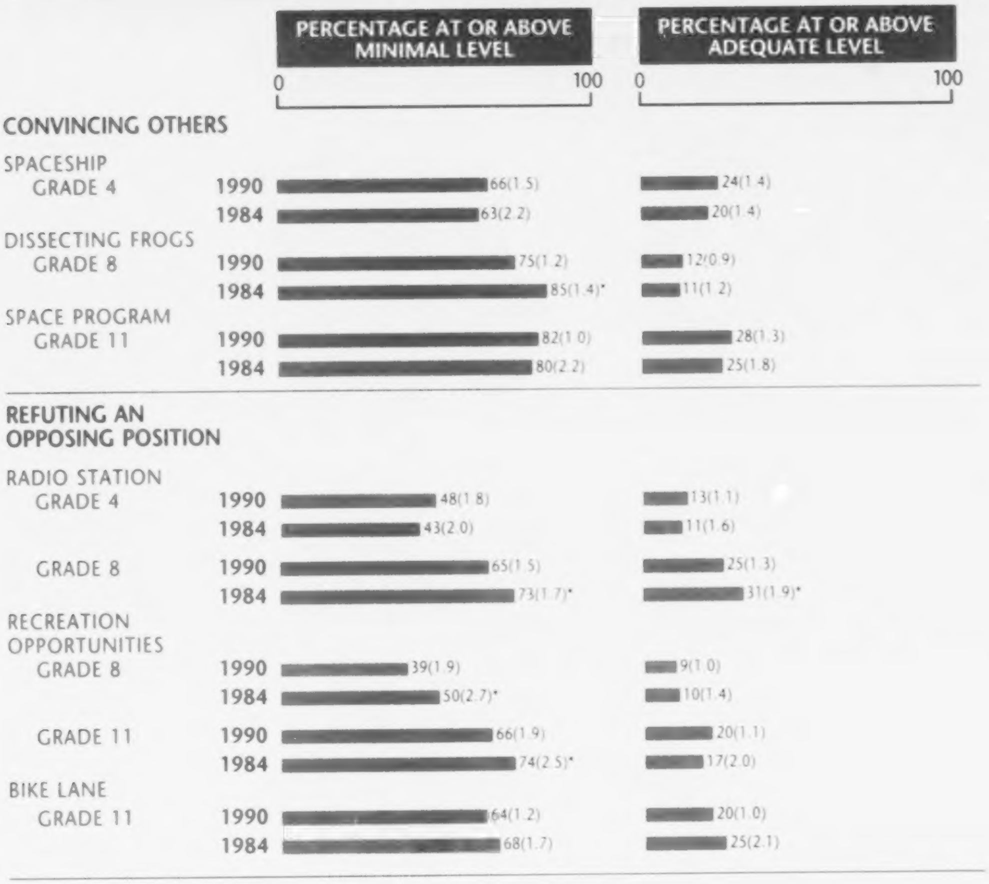
> *"Spaceship" required fourth graders to form their own points of view about whether creatures from another planet should be allowed to return home or be detained for scientific study, and to support their points of view in ways that would convince others to agree with them.*
>
> *"Dissecting Frogs" required eighth graders to take a stand on the dissection of frogs in science class, and to discuss and support their views.*
>
> *"Space Program" required eleventh graders to adopt a point of view about whether or not funding for the space program should be reduced, and to write a letter to their senators explaining their position.*

As reported in FIGURE 11.2, in both 1984 and 1990 the percentage of students who provided adequate or better responses to these tasks was far smaller than the percentage writing minimal or better responses. These results indicate that although they appeared able to understand the assignments and present their points of view, students were generally unable to support their ideas.

There were minimal changes across time in students' performance on all three "convincing" tasks — Spaceship, Dissecting Frogs, and Space Program. On the Spaceship task, in both 1984 and 1990, 20 to 24 percent of the fourth graders were able to take a stand and support it adequately. Similarly, 12 percent of the eighth graders in 1990 and 11 percent in 1984 wrote at least adequately about their views on frog dissection. However, significantly fewer were able to write a minimal-level paper in 1990 than in 1984. The performance of eleventh graders remained relatively constant from 1984 to 1990 on the Space Program task, with 80 to 82 percent writing "minimal" or better papers and 25 to 28 percent writing papers rated as "adequate" or better.

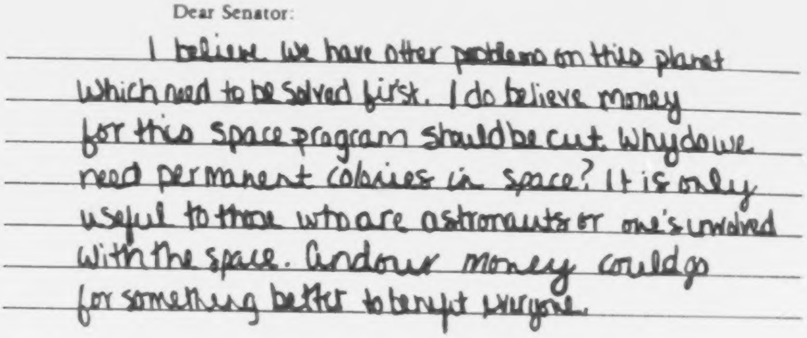
FIGURE 11.2

Trends in Persuasive Writing at Grades 4, 8, And 11



* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between each of the previous writing assessments and 1990. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

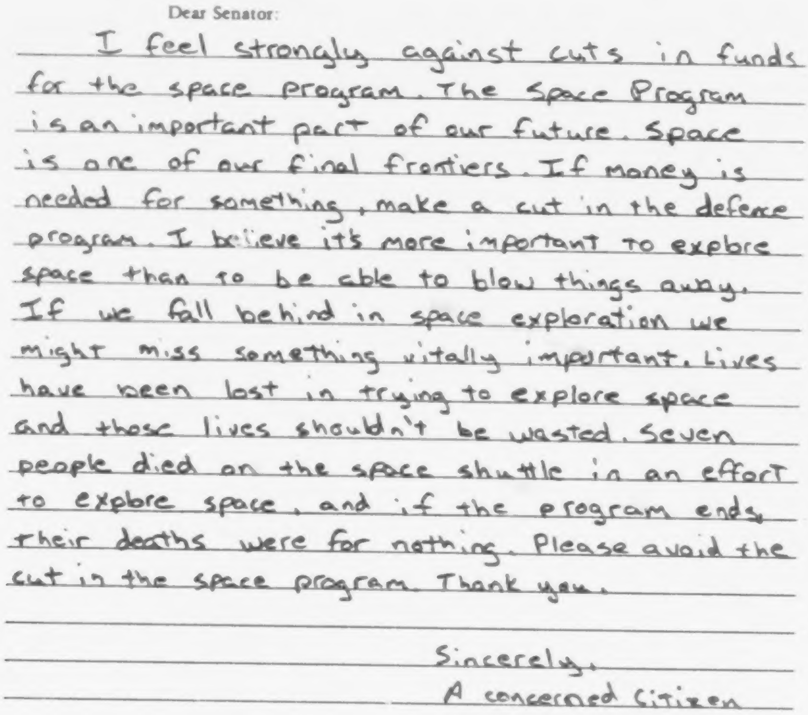
Responses that were rated as minimal took a point of view, but did not present reasons for it, nor did they provide convincing evidence that would sway a senator's vote. The following is an example of such a paper.



Dear Senator:

I believe we have other problems on this planet which need to be solved first. I do believe money for this space program should be cut. Why do we need permanent colonies in space? It is only useful to those who are astronauts or one's involved with the space. And our money could go for something better to benefit everyone.

Adequate responses supported the point of view presented with some reasoning or examples. In 1990, 28 percent of the students in grade 11 wrote such responses, as exemplified below. The most successful papers, although rare — approximately one percent — provided a well-organized argument with supporting evidence.



Dear Senator:

I feel strongly against cuts in funds for the space program. The Space Program is an important part of our future. Space is one of our final frontiers. If money is needed for something, make a cut in the defence program. I believe it's more important to explore space than to be able to blow things away. If we fall behind in space exploration we might miss something vitally important. Lives have been lost in trying to explore space and those lives shouldn't be wasted. Seven people died on the space shuttle in an effort to explore space, and if the program ends, their deaths were for nothing. Please avoid the cut in the space program. Thank you.

Sincerely,
A concerned Citizen

> *"Radio Station" required fourth and eighth graders to provide reasons why their class should be permitted to visit a local radio station despite the manager's specified concerns.*
>
> *"Recreation Opportunities" required eighth and eleventh graders to take a stand on whether their town should purchase a railroad track or a warehouse as a recreation center, to defend their choice, and to refute the alternative choice.*
>
> *"Bike Lane" required eleventh graders to take a stand on whether or not a bike lane should be installed in their locality, and to refute the opposing view.*

As was shown in FIGURE 11.2, the patterns of student performance on the "refuting" tasks in 1984 and 1990 were similar to those previously observed on the "convincing others" tasks. As might be expected, far more students wrote responses at or above the minimal level than at or above the adequate level, especially at grades eight and eleven, indicating that they were able to take a stand but not provide sufficient support to refute others' views.

The trend data reveal fluctuations at grades 8 and 11 in students' ability to perform the refuting tasks given. While the percentage of fourth graders who wrote minimal or better and adequate or better responses to the Radio Station task remained constant from 1984 to 1990, the percentage of eighth graders whose papers received a minimal or better and an adequate or better rating decreased significantly.

Also, there was a significant decline in the percentage of eighth and eleventh graders who wrote at least minimal responses to the Recreation Opportunity task, while eleventh graders' performance on the Bike Lane task remained constant from 1984 to 1990. Overall, in 1990, 80 percent of the high-school students did not write papers that were adequate or better in response to either the Recreation Opportunities task or the Bike Lane task, and approximately one-third were unable to write papers at the minimal level or better.

As shown on page 174, minimal responses to the Bike Lane task reflected students' inability to appeal to their audiences. These papers tended to state students' views and sometimes provided elaboration, but did not construct a persuasive argument.

Dear Council Members:

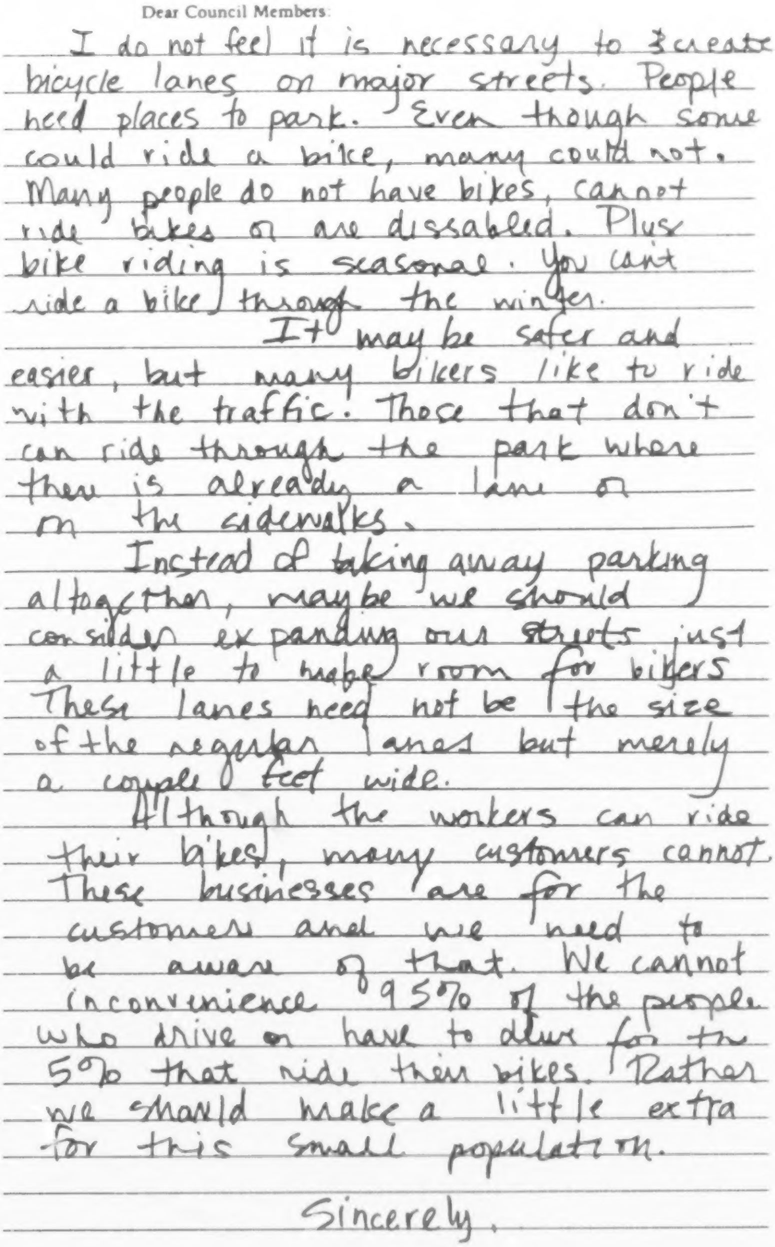
I am writing to support the proposal for the bike lanes It would be a benefit to society and our community to have these special lanes.

Riding bicycles will reduce the amount of pollution increasing the health and appearance of our city. Although it would decrease the area for parking it would not be a problem because more people would be riding bicycles and would not need a parking space.

Business would increase because the safety of bicycle riding would be guaranteed. Automobile accidents would be less likely to occur.

The majority of people would benefit from this proposal both from saving money on gasoline and getting exercise to improve their health. These are a few reasons I feel the proposal has to be passed.

As illustrated by the following example, papers judged as adequate took a stand for or against the proposal and also briefly refuted some aspect of the opposing ideas. In comparison, the one percent of the papers judged as elaborated went beyond arguing for a particular point of view to presenting an interrelated set of reasons to support students' positions; they also responded to the explicit concerns of their opponents.



Dear Council Members:

I do not feel it is necessary to create bicycle lanes on major streets. People need places to park. Even though some could ride a bike, many could not. Many people do not have bikes, cannot ride bikes or are dissabled. Plus bike riding is seasonal. You can't ride a bike through the winter.

It may be safer and easier, but many bikers like to ride with the traffic. Those that don't can ride through the park where there is already a lane or on the sidewalks.

Instead of taking away parking altogether, maybe we should consider expanding our streets just a little to make room for bikers These lanes need not be the size of the regular lanes but merely a couple feet wide.

Although the workers can ride their bikes, many customers cannot. These businesses are for the customers and we need to be aware of that. We cannot inconvenience 95% of the people who drive or have to drive for the 5% that ride their bikes. Rather we should make a little extra for this small population.

Sincerely.

HOLISTIC ANALYSES The responses of fourth graders to the Spaceship task and of eighth- and eleventh-grade students to the Recreation Opportunities task were analyzed holistically to evaluate differences in students' relative fluency in persuasive writing. As TABLE 11.2 indicates, the relative fluency of fourth graders' responses remained fairly constant from 1984 to 1990. The relative fluency of eighth graders' responses showed some signs of slight improvement.

TABLE 11.2

Trends in Fluency of Persuasive Writing: Holistic Ratings for "Spaceship" and "Recreation Opportunities" Tasks

	PERCENTAGE OF STUDENTS					
	Spaceship		**Recreation Opportunities**			
	GRADE 4		GRADE 8		GRADE 11	
Holistic Rating	**1984**	**1990**	**1984**	**1990**	**1984**	**1990**
0	4 (0.6)	3 (0.4)	1 (0.3)	1 (0.4)	1 (0.2)	1 (0.3)
1	10 (0.6)	10 (0.9)	6 (0.5)	5 (0.7)	3 (0.4)	2 (0.5)
2	31 (1.3)	30 (1.6)	21 (1.1)	20 (1.1)	14 (0.9)	15 (1.1)
3	35 (1.2)	37 (1.4)	43 (1.4)	41 (1.5)	39 (1.5)	36 (1.4)
4	15 (0.9)	16 (1.3)	22 (1.0)	23 (1.2)	28 (0.9)	29 (1.2)
5	3 (0.5)	4 (0.6)	6 (0.7)	8 (0.7)	12 (0.9)	13 (1.0)
6	1 (0.3)	1 (0.2)	1 (0.3)	3 (0.4)	3 (0.4)	5 (0.6)
4, 5, or 6	19 (1.1)	20 (1.6)	30 (1.2)	34 (1.7)	43 (1.4)	47 (1.6)
Average Rating	2.6 (0.0)	2.7 (0.0)	3.0 (0.0)*	3.1 (0.0)	3.4 (0.0)	3.5 (0.0)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between each of the previous writing assessments. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

NATIONAL TRENDS IN NARRATIVE WRITING ACHIEVEMENT FROM 1984 TO 1990

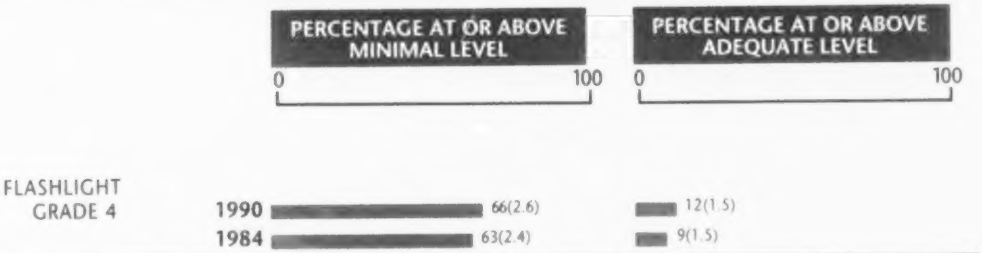
Narrative writing allows us to participate in literary experiences. Whether writing personal stories of pain and triumph or fictional tales of interplanetary visits, the goal is to create a momentary reality that is apart from the everyday.[67] As with the other types of writing, narrative writing can be more or less formal, academic, or complex.

The following narrative writing task was presented at the grade 4 level in the 1984 and 1990 writing trend assessments.

> *"Flashlight" required fourth graders to write a story about their imagined adventures with a flashlight that has special powers.*

The percentages of students who wrote papers that were judged minimal or better and adequate or better in 1984 and 1990 are provided in FIGURE 11.3.

FIGURE 11.3
Trends in Narrative Writing at Grade 4



* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between each of the previous writing assessments and 1990. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

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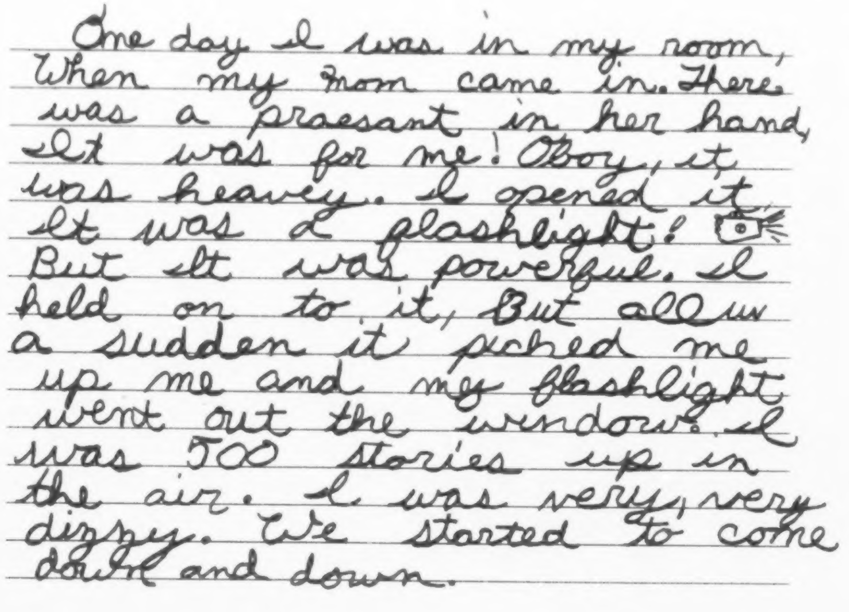
[67] James Moffett, *Teaching the Universe of Discourse* (Boston, MA: Houghton Mifflin, Co., 1968).

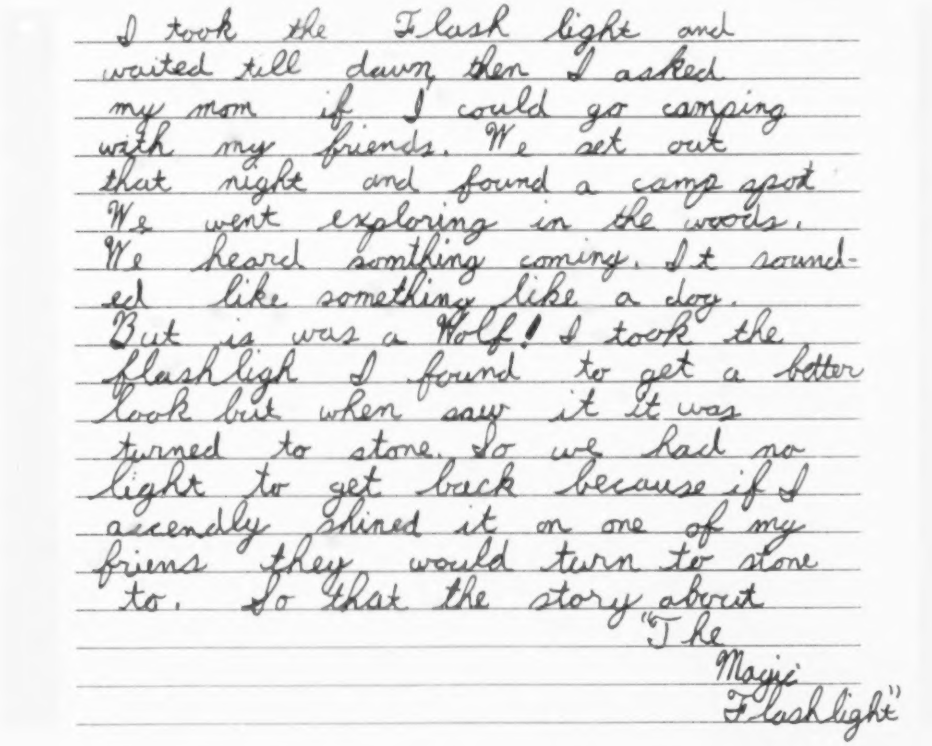
In both the 1984 and 1990 assessments, fourth graders found it difficult to write well-developed stories. In 1984, 63 percent of these students seemed to grasp the basic elements of storytelling, but only 9 percent were able to successfully develop their stories. The 1990 data indicate some progress in story writing, as 12 percent of the students were able to write at the adequate level or better, but this apparent increase was not statistically significant. The percentage of responses judged at least minimal or at least adequate did not change significantly across the six-year period.

Students providing responses at the minimal level seemed to understand the narrative character of the Flashlight task, but were unable to carry it out. At this level, students attempted a story, but provided only a bare outline with little detail. Sometimes they rambled or offered lists of details or events, with no point or organization. The following is an example of a paper rated as minimal.



One day I was in my room,
When my mom came in. There
was a praesant in her hand,
It was for me! Oboy, it
was heavey. I opened it,
It was a flashlight!
But It was powerful. I
held on to it, But all in
a sudden it piched me
up me and my flashlight
went out the window. I
was 500 stories up in
the air. I was very, very
dizzy. We started to come
down and down.

The following is an example of an adequate paper. This type of response reflected the storyteller's obligation to develop a plot and elaborate it with details, including events, characters, and setting. However, the plots were not as explicit nor as clearly developed as in the elaborated stories.



I took the Flash light and waited till dawn then I asked my mom if I could go camping with my friends. We set out that night and found a camp spot We went exploring in the woods. We heard somthing coming. It sounded like something like a dog. But is was a Wolf! I took the flashligh I found to get a better look but when saw it it was turned to stone. So we had no light to get back because if I accendly shined it on one of my friens they would turn to stone to. So that the story about "The Magic Flashlight"

HOLISTIC ANALYSES As shown in TABLE 11.3, the relative fluency of fourth graders' written responses to the Flashlight task remained the same between 1984 and 1990.

TABLE 11.3

Trends in Fluency of Imaginative Writing: Holistic Ratings for "Flashlight" Task

	PERCENTAGE OF STUDENTS	
	GRADE 4	
Holistic Rating	1984	1990
0	1.0 (0.2)	1.7 (0.6)
1	14.0 (0.9)	15.0 (1.8)
2	31.0 (1.1)	27.0 (1.9)
3	29.0 (1.2)	29.0 (2.0)
4	16.0 (1.1)	17.0 (1.6)
5	7.0 (0.7)	7.0 (0.9)
6	3.0 (0.4)	2.0 (0.5)
4, 5, or 6	26.0 (1.5)	27.0 (1.9)
Average Rating	2.8 (0.0)	2.8 (0.1)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between each of the previous writing assessments. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

NATIONAL TRENDS IN GRAMMAR, PUNCTUATION, AND SPELLING FROM 1984 TO 1990 To examine students' abilities to adhere to the conventions of written English, one task at each grade was selected for further analysis. The tasks chosen were Spaceship at grade 4 and Recreation Opportunities at grades 8 and 11. Nationally representative subsamples of papers were drawn from the total national sample to permit a detailed analysis of writing mechanics; in addition to measures of overall quality, each paper was analyzed for a variety of aspects of spelling, word choice, punctuation, and syntax.

TRENDS IN OVERALL CHARACTERISTICS OF THE PAPERS

As students gain control of written English, they should be able to use a larger number of words in a growing number of sentences, with relatively greater ease and fewer errors.[68] TABLE 11.4 summarizes trends in the general characteristics of the papers at each grade, giving the mean scores and standard errors for each grade. (Since the fourth-grade data are based on a different writing task, comparisons of the results for grade 4 to those for grades 8 and 11 are not appropriate.) TABLE 11.4 also includes the average results for male and female, and Black and White students. For a presentation of these results by percentiles, see the Data Appendix.

At grade 4, papers written in 1990 were about the same length (number of words) as those written in 1984. At grade 8, the 1990 papers were significantly longer than those of 1984, whereas at eleventh grade the slight increase in length was not significant. Word length (an index of vocabulary) and average number of words per sentence (an index of sentence complexity) showed no significant change between 1984 and 1990 at any of the three grades. The average number of sentences written by eighth graders changed significantly from 1984 to 1990, while the number of sentences written by fourth and eleventh graders remained the same. The number of errors per 100 words (error rate) increased significantly between 1984 and 1990 at grade 8, but did not change significantly at grades 4 and 11. Because students' responses represent first-draft writing, it is reasonable to expect some errors in their papers. It may be that error rates would be even lower if students had been given more time to look for and correct their errors.

An examination of trends in the overall characteristics of papers by gender and race/ethnicity reveals that between 1984 and 1990 there was a significant increase in the average number of words and average number of sentences in papers written by eighth-grade females. Eighth-grade males and females, and eleventh-grade males and females all made significantly more errors in 1990 than in 1984. The overall error rate for eighth-grade males increased significantly in 1990. Between 1984 and 1990, the number of sentences used by Black eleventh graders increased significantly, while their average

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[68] Ian Pringle and Aviva Freedman, *A Comparative Study of Writing Abilities in Two Modes at the Grade 5, 8 and 12 Levels* (Toronto, Ontario: The Minister of Education, Ontario, 1985).

TABLE 11.4

Trends in Overall Characteristics of Papers for the Nation and Demographic Subpopulations, 1984 to 1990

				RACE/ETHNICITY		GENDER	
		Year	Overall Average	Black	White	Male	Female
Number of Words	**Grade 4**	1990	34 (1.1)	35 (3.4)	33 (1.3)	29 (1.5)	38 (1.5)
		1984	34 (1.0)	32 (2.6)	34 (1.2)	30 (1.2)	38 (1.4)
	Grade 8	1990	74 (2.2)	71 (4.7)	75 (2.8)	61 (2.4)	88 (3.4)
		1984	68 (1.9)*	58 (4.2)	70 (2.1)	60 (2.3)	76 (2.8)*
	Grade 11	1990	97 (2.6)	86 (4.2)	100 (3.2)	86 (4.0)	109 (3.0)
		1984	93 (2.3)	81 (3.8)	97 (3.0)	81 (2.5)	106 (3.6)
Word Length	**Grade 4**	1990	4 (0.0)	4 (0.0)	4 (0.0)	4 (0.0)	4 (0.0)
		1984	4 (0.0)	4 (0.1)	4 (0.0)	4 (0.0)	4 (0.0)
	Grade 8	1990	4 (0.0)	4 (0.0)	4 (0.0)	4 (0.0)	4 (0.0)
		1984	4 (0.0)	4 (0.0)	4 (0.0)	4 (0.0)	4 (0.0)
	Grade 11	1990	4 (0.0)	4 (0.0)	4 (0.0)	4 (0.0)	4 (0.0)
		1984	4 (0.0)	4 (0.0)	4 (0.0)	4 (0.0)	4 (0.0)
Number of Sentences	**Grade 4**	1990	3 (0.1)	2 (0.2)	3 (0.1)	2 (0.1)	3 (0.1)
		1984	3 (0.1)	2 (0.3)	3 (0.1)	2 (0.1)	3 (0.2)
	Grade 8	1990	5 (0.1)	5 (0.3)	5 (0.2)	4 (0.2)	6 (0.2)
		1984	4 (0.1)*	4 (0.3)	5 (0.2)	4 (0.2)	5 (0.2)*
	Grade 11	1990	6 (0.2)	5 (0.2)	6 (0.2)	5 (0.3)	7 (0.2)
		1984	6 (0.2)	4 (0.2)*	6 (0.2)	5 (0.2)	6 (0.2)
Number of Words per Sentence	**Grade 4**	1990	16 (0.6)	20 (2.8)	15 (0.5)	16 (0.8)	16 (0.8)
		1984	15 (0.4)	16 (0.6)	15 (0.5)	15 (0.6)	15 (0.5)
	Grade 8	1990	17 (0.3)	18 (0.6)	16 (0.4)	17 (0.4)	16 (0.5)
		1984	17 (0.4)	19 (1.2)	17 (0.3)	18 (0.7)	16 (0.4)
	Grade 11	1990	18 (0.3)	18 (0.7)	17 (0.3)	18 (0.5)	17 (0.3)
		1990	18 (0.4)	21 (0.7)*	18 (0.5)	19 (0.8)	17 (0.5)
Number of Errors	**Grade 4**	1990	5 (0.3)	6 (0.4)	5 (0.3)	5 (0.3)	5 (0.5)
		1984	5 (0.2)	6 (0.5)	4 (0.2)	4 (0.3)	5 (0.3)
	Grade 8	1990	7 (0.2)	8 (0.5)	7 (0.3)	7 (0.3)	7 (0.3)
		1984	6 (0.2)*	6 (0.5)	6 (0.2)*	5 (0.2)*	6 (0.3)*
	Grade 11	1990	7 (0.3)	7 (0.5)	6 (0.3)	7 (0.4)	7 (0.3)
		1984	6 (0.2)*	6 (0.5)	6 (0.2)	6 (0.2)*	6 (0.3)*
Error Rate	**Grade 4**	1990	18 (0.8)	22 (1.8)	16 (1.0)	20 (1.2)	15 (0.8)
		1984	16 (0.6)	20 (1.2)	14 (0.7)	17 (1.0)	14 (0.8)
	Grade 8	1990	11 (0.4)	13 (0.9)	10 (0.5)	13 (0.7)	9 (0.4)
		1984	9 (0.3)*	13 (1.0)	8 (0.4)*	10 (0.5)*	8 (0.4)
	Grade 11	1990	8 (0.3)	9 (0.4)	7 (0.2)	9 (0.7)	7 (0.3
		1984	7 (0.2)	8 (0.4)	6 (0.2)	8 (0.3)	6 (0.3)

*Statistically significant different from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between each of the previous assessments and 1990. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

number of words per sentence decreased. Also, the error rate increased for eighth-grade White students from 1984 to 1990.

The Data Appendix contains a summary of the trends for papers that were rated "adequate or better" or "minimal or below" in task accomplishment, and for those that were rated "4, 5, or 6" or "1, 2, or 3" in relative fluency. In general, the more effective papers in task accomplishment at grade 8 showed a significant increase in the number of sentences and the number of words. The less effective papers at grades 8 and 11 showed a significant increase in the number of errors. For papers rated high in relative fluency, there was a significant increase in the number of words as well as an increase in the number of errors at grades 8 and 11.

TRENDS IN CONTROL OF SENTENCE STRUCTURE

Students' control of syntax is reflected in the types of errors found in the sentences they create. To examine changes across time in students' command of sentence structure, four types of sentence errors — run-ons, fragments, awkward sentences, and sentences with agreement errors — were marked in the 1984 and 1990 papers.

TABLE 11.5 presents the average percentage of sentence-level errors per student for grades 4, 8, and 11. For the overall population, there were no significant changes across time at any grade in the percentage of papers containing run-on sentences, sentences with agreement errors, or fragments.

Awkward sentences appeared to be a more pervasive problem at all three grades. In 1990, 35 percent of the sentences in fourth graders' papers were considered awkward — a significant increase since 1984. At grade 8, 40 percent of the sentences were rated awkward, as were 38 percent in grade 11 — both significant increases from 1984.

An examination of changes in students' control of sentence structure by gender and race/ethnicity shows a significant increase in the percentage of awkward sentences for females at both grades 8 and 11 as well as an increase in the percentage of sentence agreement errors made by eleventh-grade females. For males, there was a significant increase in the percentage of awkward sentences at grade 4.

For Black students in grade 4 and White students in grade 8 the percentage of run-on sentences increased significantly. Also, the percentage of awkward sentences increased for White students at all three grade levels.

The results by percentile reveal that one-half of the papers at grade 4 contained no run-on sentences, and 75 percent contained no fragments or sentences with agreement errors. (See the Data Appendix for the results reported by percentiles.) At grades 8 and 11, three-quarters of the papers contained virtually none of these types of errors. The trends in

TABLE 11.5

Trends in Sentence-Level Errors for the Nation and Demographic Subpopulations, 1984 to 1990

				RACE/ETHNICITY		GENDER	
		Year	**Overall Average**	**Black**	**White**	**Male**	**Female**
Percentage Run-on Sentences	**Grade 4**	1990	17 (1.6)	23 (3.4)	16 (2.0)	20 (2.5)	15 (2.2)
		1984	15 (1.5)	11 (2.5)*	15 (1.5)	14 (2.0)	17 (2.2)
	Grade 8	1990	10 (0.9)	10 (1.6)	9 (1.1)	12 (1.7)	8 (1.0)
		1984	7 (0.9)	8 (2.4)	6 (0.9)*	8 (1.4)	6 (1.0)
	Grade 11	1990	5 (0.9)	7 (2.0)	5 (0.8)	7 (1.6)	4 (0.7)
		1984	5 (0.7)	5 (1.6)	5 (0.8)	5 (1.1)	4 (0.9)
Percentage Sentence Fragments	**Grade 4**	1990	4 (0.7)	4 (1.8)	4 (0.9)	4 (0.8)	5 (0.9)
		1984	3 (0.5)	4 (1.4)	3 (0.6)	3 (0.8)	3 (0.6)
	Grade 8	1990	4 (0.4)	5 (1.2)	3 (0.5)	4 (0.6)	4 (0.6)
		1984	3 (0.5)	5 (1.4)	3 (0.5)	4 (0.9)	3 (0.5)
	Grade 11	1990	3 (0.4)	6 (1.2)	2 (0.4)	3 (0.7)	2 (0.5)
		1984	3 (0.4)	5 (1.1)	2 (0.4)	4 (0.8)	2 (0.5)
Percentage Sentences with Agreement Errors	**Grade 4**	1990	4 (0.6)	6 (1.5)	2 (0.6)	3 (0.9)	4 (1.0)
		1984	4 (0.7)	8 (2.3)	3 (0.7)	3 (0.7)	4 (1.1)
	Grade 8	1990	4 (0.6)	5 (1.4)	3 (0.7)	5 (1.0)	3 (0.5)
		1984	3 (0.6)	3 (1.3)	3 (0.7)	3 (0.8)	3 (0.9)
	Grade 11	1990	3 (0.3)	4 (1.2)	2 (0.3)	2 (0.4)	3 (0.4)
		1984	3 (0.5)	3 (0.8)	3 (0.7)	4 (1.0)	1 (0.3)*
Percentage Awkward Sentences	**Grade 4**	1990	35 (1.8)	50 (3.6)	30 (2.2)	36 (2.6)	33 (2.9)
		1984	25 (2.2)*	45 (5.5)	20 (2.1)*	26 (2.6)*	25 (2.7)
	Grade 8	1990	40 (1.5)	48 (2.9)	37 (1.9)	41 (2.3)	39 (1.9)
		1984	32 (1.5)*	50 (4.9)	28 (1.7)*	34 (2.5)	30 (1.8)*
	Grade 11	1990	38 (1.7)	40 (2.5)	35 (2.1)	40 (2.5)	35 (1.6)
		1984	31 (1.7)*	39 (5.2)	28 (1.7)*	35 (2.4)	27 (2.0)*

* Statistically significant different from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between each of the previous writing assessments and 1990. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

sentence errors for good and poor papers revealed no consistent trends (see Data Appendix). However, at each grade, there was a general increase in the percentage of awkward sentences for both good and poor papers.

TRENDS IN CONTROL OF WORD-LEVEL CONVENTIONS Students' control of word-level conventions is reflected in their spelling, capitalization, and word-choice errors, which are summarized in TABLE 11.6. Across the grades, the percentages of misspelled words in

TABLE 11.6

Trends in World-Level Errors for the Nation and Demographic Subpopulations, 1984 to 1990

				RACE/ETHNICITY		GENDER	
		Year	Overall Average	Black	White	Male	Female
Percentage Misspelled Words	**Grade 4**	1990	9 (0.6)	10 (1.1)	9 (0.6)	11 (0.8)	8 (0.5)
		1984	8 (0.4)	10 (1.0)	8 (0.6)	9 (0.7)	7 (0.5)
	Grade 8	1990	4 (0.3)	4 (0.5)	4 (0.3)	6 (0.5)	3 (0.2)
		1984	4 (0.2)	4 (0.5)	4 (0.2)	4 (0.4)	3 (0.2)
	Grade 11	1990	3 (0.3)	3 (0.3)	3 (0.2)	4 (0.7)	2 (0.1)
		1984	2 (0.1)	2 (0.2)*	2 (0.1)	3 (0.2)	2 (0.2)
Percentage Word-Choice Errors	**Grade 4**	1990	1 (0.1)	1 (0.1)	0 (0.1)	1 (0.1)	1 (0.1)
		1984	1 (0.1)	2 (0.4)*	1 (0.1)	1 (0.1)	1 (0.1)
	Grade 8	1990	1 (0.1)	1 (0.2)	1 (0.1)	1 (0.1)	1 (0.1)
		1984	1 (0.1)	1 (0.4)	1 (0.1)	1 (0.1)	1 (0.1)
	Grade 11	1990	1 (0.1)	1 (0.1)	1 (0.1)	1 (0.1)	1 (0.1)
		1984	1 (0.1)	1 (0.2)	1 (0.1)	1 (0.1)	1 (0.1)
Percentage Capitalization Errors	**Grade 4**	1990	1 (0.1)	1 (0.3)	1 (0.2)	1 (0.2)	1 (0.1)
		1984	1 (0.1)	1 (0.2)	1 (0.1)	1 (0.1)	1 (0.2)
	Grade 8	1990	0 (0.1)	1 (0.1)	0 (0.1)	0 (0.1)	0 (0.1)
		1984	0 (0.1)	1 (0.2)	0 (0.1)	0 (0.1)	0 (0.1)
	Grade 11	1990	0 (0.0)	0 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)
		1984	0 (0.0)	0 (0.1)	0 (0.0)	0 (0.1)	0 (0.0)

* Statistically significant different from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between each of the previous writing assessments and 1990. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

students' papers were similar in 1984 and 1990. Students in grade 4 misspelled an average of 9 percent of the words they used, and even the better spellers (the 25 percent whose papers had the fewest misspellings) misspelled up to 2 percent of their words in 1990. At grade 11, students averaged only 3 percent misspellings overall, and the best spellers had fewer than 1 percent spelling errors (see the Data Appendix for the results by percentiles). Errors in word choice and capitalization were rare across the grades, and there were no significant changes in the rate of these errors between 1984 and 1990.

For Black students there was a significant increase in the percentage of spelling errors at grade 11 and a decline in the percentage of word-choice errors at grade 4. Otherwise, the pattern for males and females and Black and White students mirrors that of the nation: few word-choice and capitalization errors at any grade and an overall decline in spelling errors as students progress through the grades.

In the Data Appendix, these data are presented separately for papers rated as "good" and "poor." As with the results for students' papers overall, errors in capitalization and word choice were relatively rare in both "good" and "poor" papers.

TRENDS IN CONTROL OF PUNCTUATION

Punctuation was analyzed in terms of both the particular marks that students used correctly or incorrectly and the marks that should have been used when punctuation was omitted. Trends in punctuation uses and omissions are summarized in TABLE 11.7.

TABLE 11.7

Trends in Punctuation Errors for the Nation and Demographic Subpopulations, 1984 to 1990

				RACE/ETHNICITY		GENDER	
		Year	**Overall Average**	**Black**	**White**	**Male**	**Female**
Total Punctuation Errors Per 100 Words	**Grade 4**	1990	3 (0.3)	5 (0.8)	3 (0.3)	3 (0.4)	3 (0.3)
		1984	3 (0.2)	3 (0.5)	2 (0.3)	3 (0.3)	3 (0.3)
	Grade 8	1990	2 (0.1)	3 (0.4)	2 (0.1)	2 (0.2)	2 (0.1)
		1984	2 (0.1)	3 (0.4)	2 (0.1)	2 (0.2)	2 (0.2)
	Grade 11	1990	2 (0.1)	2 (0.2)	1 (0.1)	2 (0.1)	2 (0.1)
		1984	2 (0.1)	2 (0.1)	2 (0.2)	2 (0.2)	2 (0.2)
Punctuation Omitted Per 100 Words	**Grade 4**	1990	3 (0.3)	4 (0.8)	3 (0.3)	3 (0.4)	3 (0.3)
		1984	2 (0.2)	3 (0.4)	2 (0.2)	2 (0.3)	2 (0.3)
	Grade 8	1990	2 (0.1)	3 (0.4)	2 (0.1)	2 (0.2)	2 (0.1)
		1984	1 (0.1)*	2 (0.4)	1 (0.1)*	1 (0.1)*	1 (0.1)
	Grade 11	1990	1 (0.1)	1 (0.1)	1 (0.1)	1 (0.1)	1 (0.1)
		1984	1 (0.1)	2 (0.1)	1 (0.1)	1 (0.2)	1 (0.2)
Wrong Punctuation Per 100 Words	**Grade 4**	1990	0 (0.0)	0 (0.1)	0 (0.0)	0 (0.0)	0 (0.1)
		1984	0 (0.1)	1 (0.3)	0 (0.0)	0 (0.1)	0 (0.1)
	Grade 8	1990	0 (0.0)	0 (0.1)	0 (0.1)	0 (0.1)	0 (0.0)
		1984	1 (0.1)*	0 (0.1)	1 (0.1)	1 (0.1)	0 (0.1)
	Grade 11	1990	0 (0.0)	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)
		1984	0 (0.0)	1 (0.1)	0 (0.0)	0 (0.1)	0 (0.1)

* Statistically significant different from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between each of the previous writing assessments and 1990. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

The patterns of punctuation errors found in the 1990 papers were comparable to those found in the 1984 papers. In general, most students made few errors in punctuation, although the 10 percent most error-prone papers had four or more punctuation errors per 100 words even at grade 11 (see the Data Appendix for results by percentiles). At grade eight, the average number of punctuation marks omitted per 100 words increased significantly, while the average number of wrong punctuation marks used per 100 words decreased significantly.

For male and White students at grade 8, there was a slight, although statistically significant, increase in punctuation omitted. Otherwise, there was a general decline in punctuation errors and omissions at each grade. An examination of the trends in punctuation errors across the grades for good and poor papers reveals a pattern of changes that appears consistent with the national trend. At grade 4, the less fluent and less effective papers had slightly more punctuation errors and omissions than did the more fluent and more effective papers.

SUMMARY

TRENDS IN INFORMATIVE WRITING. Trends in students' responses to the five informative writing tasks reveal little progress across time. In both 1984 and 1990, about two-thirds of the eleventh graders were able to write from personal experience and supply adequate information for a job application, but only about one-half were able to write an adequate newspaper report from given information. For fourth and eighth graders, changes in performance on these tasks were inconsistent. The large majority of eighth graders in both 1984 and 1990 were able to write a minimal or better newspaper article from given information, and 39 to 46 percent wrote adequate or better articles. At the same time, significantly fewer eighth graders wrote minimal or better letters to a company using given information, yet the percentage who wrote adequate or better letters remained high from 1984 to 1990. Also, while the percentage of eighth graders who wrote minimal or better responses to an analytic task declined significantly, the percentage who wrote adequate or better responses increased. When fourth graders' were asked to summarize a science experiment, significantly fewer wrote minimal or better responses in 1990 than in 1984; yet, when asked to write a newspaper article, significantly more wrote a minimal or better response and significantly fewer wrote an adequate or better response in 1990 than in 1984.

Some improvement was found in analytic writing. For example, eighth graders in 1990 were significantly more likely than those in 1984 to write an adequate or better report in response to the Food on the Frontier task. No changes at any grade level were evident in students' relative fluency in response to this task. Also, in 1990, at grades 8 and

11, the percentage of students writing adequate or better responses remained quite low (16 to 19 percent).

TRENDS IN PERSUASIVE WRITING. For the tasks that asked students to convince others to adopt a point of view, minimal changes occurred at all three grade levels from 1984 to 1990. For the tasks that asked students to refute an opposing point of view, eighth-grade students declined significantly on both and even at grade 11 there was a decline in students' performance on refutation tasks. However, eighth graders did show increased fluency on one of their refutation tasks. Taken together, these results may indicate some slippage in persuasive writing abilities. In 1990, the vast majority of high school juniors did not write persuasive papers that were judged adequate to influence others or move them to action.

TRENDS IN NARRATIVE WRITING. Overall, fourth-grade students had difficulty writing well-developed stories. In 1990, 65 percent of the students at grade 4 performed at the minimal level or better, providing responses that at least attempted the basic task of storytelling. Twelve percent were able to develop their stories, structuring a plot and supplying appropriate details. Similar to the results for informative and persuasive writing, the average narrative writing achievement of students was relatively low and the overall fluency of their writing (based on the same Flashlight task) remained the same.

TRENDS IN GRAMMAR, PUNCTUATION, AND SPELLING. Detailed analyses of the performance of fourth, eighth, and eleventh graders suggest there have been few changes in students' mastery of conventions between 1984 and 1990. In both 1984 and 1990, most students were able to control the conventions of written English. Although fourth graders had difficulties with spelling and with some aspects of grammar and usage, most of these problems disappeared by grade 11. However, there was an increase in the error rate in eighth-grade papers, as well as an increase in the percentage of awkward sentences at all three grades. Generally, the errors that were most frequent for a particular group of students or at a particular grade level were found in the papers written by only a small proportion of those students.

CHAPTER TWELVE

TRENDS IN ATTITUDES, WRITING BEHAVIORS, AND INSTRUCTION

In addition to providing responses to various writing tasks, students participating in the 1984 and 1990 writing assessments were asked to complete a series of questions related to their attitudes toward writing, their abilities to manage the writing process, and their instructional environments. This chapter summarizes trends in their responses to these questions.[69]

LEARNING TO VALUE WRITING One of the key goals of writing instruction is to encourage students to see writing as a useful tool for their lives both in and out of school, and to think of themselves as writers.[70] As a way of measuring trends in students' attitudes toward writing, one set of questions in the 1984 and 1990 assessments asked students about the value they placed on writing, their attitudes toward their writing, and the ways in which they used writing in their lives.

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[69] Because of the assessment design and the analytic methods used in calculating the writing trend results, no data are available for responses to background questions in relation to average writing achievement across prompts.

[70] Lee Odell and Dixie Goswami, "Writing in a Nonacademic Setting," in *New Directions in Composition Research,* Richard Beach and Lillian S. Bridwell, editors (New York: The Guilford Press, 1984).

Questions dealing with the value placed on writing asked students to what extent they agreed with statements such as "Writing helps me think more clearly," "Writing helps tell others what I think," and "People who write well have a better chance of getting good jobs." Their responses are presented in TABLE 12.1.

For eighth graders, there was a significant increase from 1984 to 1990 in the percentage who reported that they valued writing in certain ways. Students in the eighth grade were significantly more likely in 1990 than in 1984 to agree with the following statements: "Writing helps me understand my own feelings," "People who write well have a better chance of getting good jobs," and "People who write well are more influential." For eleventh graders, there was no significant change over time in their responses to questions about the value of writing.

Although both the 1984 and 1990 responses suggested that writing is valued by only about one-half the students at eighth and eleventh grades, there was a significant increase between the two assessments in the value eighth graders placed on writing.

TABLE 12.1

Trends in the Value Placed on Writing, 1984 to 1990

	PERCENTAGE OF STUDENTS REPORTING THE STATEMENTS AS TRUE MORE THAN HALF THE TIME		
	Year	**Grade 8**	**Grade 11**
Writing helps me to think more clearly.	1990	46 (1.2)	47 (1.4)
	1984	45 (2.0)	52 (3.0)
Writing helps me tell others what I think.	1990	56 (1.3)	58 (1.2)
	1984	52 (2.1)	55 (2.0)
Writing helps me tell others how I feel.	1990	56 (1.7)	60 (1.3)
	1984	50 (2.0)	55 (2.3)
Writing helps me understand my own feelings.	1990	47 (1.6)	50 (1.3)
	1984	40 (2.2)*	47 (2.1)
People who write well have a better chance of getting good jobs.	1990	53 (1.3)	58 (1.5)
	1984	47 (2.9)*	54 (2.1)
People who write well are more influential.	1990	55 (1.3)	60 (1.2)
	1984	49 (1.9)*	54 (2.4)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between each of the previous writing assessments and 1990. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

Students' responses to questions about their attitudes toward writing are summarized in TABLE 12.2. Items in this set asked students to react to statements such as "I like to write" and "I write on my own outside of school."

In both 1984 and 1990, students' attitudes about writing were relatively negative, and increasingly so in the upper grades. Thus, while 57 percent of the fourth-grade students claimed that they liked to write in 1990, only 42 percent of the eighth graders and 39 percent of the eleventh graders agreed with this statement. An interesting exception to this pattern is evident in students' responses to the statement on writing outside of school, where students in the upper grades were less likely to agree that they would not write anything if they were not required to for school.

At the same time, students in the upper grades were less likely to report that they actually wrote on their own outside of school. There was a significant decrease in the percentage of fourth-grade students who agreed that they wouldn't write anything if they didn't have to write for school. In general, eighth graders' attitudes towards writing did

TABLE 12.2

Trends in Attitudes Toward Writing, 1984 to 1990

		PERCENTAGE OF STUDENTS REPORTING THE STATEMENTS AS TRUE MORE THAN HALF THE TIME		
	Year	**Grade 4**	**Grade 8**	**Grade 11**
I like to write.	1990	57 (1.7)	42 (1.3)	39 (1.3)
	1984	56 (2.3)	39 (2.5)	40 (2.5)
I am a good writer.	1990	62 (1.4)	44 (1.3)	44 (1.3)
	1984	60 (2.1)	42 (1.8)	39 (1.9)*
People like what I write.	1990	56 (1.8)	39 (1.6)	42 (1.3)
	1984	53 (2.1)	38 (2.4)	36 (2.6)
I write on my own outside of school.	1990	42 (1.5)	35 (1.4)	28 (1.0)
	1984	48 (1.9)	36 (2.5)	31 (2.7)
I don't like to write things that will be graded.	1990	33 (1.5)	36 (1.2)	30 (1.4)
	1984	38 (2.0)	31 (2.2)	27 (1.9)
If I didn't have to write for school, I wouldn't write anything.	1990	27 (1.2)	19 (1.1)	16 (1.0)
	1984	33 (1.7)*	17 (2.2)	15 (1.4)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between each of the previous writing assessments and 1990. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

not change significantly over time, while at the eleventh grade there was a significant increase in the percentage of students who said they were good writers.

Based on these results, it appears that the attitudes of students towards writing have not changed that much since 1984 and that the majority of the students surveyed have somewhat negative views of writing, especially at the higher grade levels.

Another set of questions asked students about the uses of writing in their own lives, including such personal uses as keeping a diary or journal, as well as such functional uses as making lists of things to do or buy. Students' responses to these questions are presented in TABLE 12.3.

To a certain extent, trends in responses to these items mirrored the changes observed in values and attitudes. At grades 4 and 11, students' reported uses of writing remained fairly constant across the two assessments, while eighth-grade students reported several changes in their uses of writing. From 1984 to 1990, there was a significant increase in the percentage of eighth graders who reported that they wrote letters to friends or relatives, wrote stories or poems outside of school, and filled out order blanks.

TABLE 12.3
Trends in Personal and Social Uses of Writing, 1984 to 1990

	PERCENTAGE OF STUDENTS REPORTING KINDS OF WRITING AT LEAST ONCE A WEEK			
	Year	**Grade 4**	**Grade 8**	**Grade 11**
Write letters to friends or relatives	1990	37 (1.5)	47 (1.6)	—
	1984	33 (2.1)	37 (2.0)*	—
Write notes and messages	1990	46 (1.8)	74 (1.4)	—
	1984	44 (2.4)	68 (2.0)	—
Write stories or poems that are not school work	1990	26 (1.4)	14 (0.9)	—
	1984	26 (1.8)	10 (1.0)*	—
Make lists of things to buy or do	1990	—	47 (1.5)	48 (1.3)
	1984	—	44 (2.4)	46 (2.3)
Fill out order blanks to buy things	1990	—	23 (1.2)	16 (1.1)
	1984	—	17 (1.8)*	16 (2.0)
Write for the school newspaper, magazine, or yearbook	1990	—	9 (1.0)	7 (0.8)
	1984	—	8 (1.1)	5 (0.8)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between each of the previous writing assessments and 1990. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

MANAGING THE WRITING PROCESS In addition to building positive attitudes toward writing, teachers have sought to help students develop effective strategies for managing writing processes, including strategies for planning and revising what they write. Previous studies and earlier national assessments of writing have shown that students who make use of a variety of strategies are more likely to be effective writers.[71]

One writing task given as part of both assessments provided an opportunity to observe explicit planning strategies.[72] The Recreation Opportunities task was formatted so that the remainder of the page on which the writing prompt was printed was left blank and the students were told that this space was available to make notes before writing. The following pages were to be used for students' actual responses. In addition to rating the quality of the responses, raters noted whether the students had used the space provided to make notes.

TABLE 12.4 summarizes the evidence of overt planning for the eighth and eleventh graders who were given this writing task. In both grades, the overall proportion of students engaging in overt planning was small and did not change across time.

TABLE 12.4

Trends in Overt Planning on "Recreation Opportunities" Task, 1984 to 1990

	PERCENTAGE USING SPACE PROVIDE FOR PLANNING	
Year	**Grade 8**	**Grade 11**
1990	16 (1.0)	18 (1.2)
1984	16 (2.4)	18 (2.0)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between each of the previous writing assessments and 1990. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

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[71] Arthur N. Applebee, Judith A. Langer, Lynn B. Jenkins, Ina V.S. Mullis, and Mary A. Foertsch, *Learning to Write in Our Nation's Schools: Instruction and Achievement in 1988 at Grades 4, 8, and 12* (Princeton, NJ: National Assessment of Educational Progress, Educational Testing Service, 1990).

Carl Bereiter and Marlene Scardamalia, *The Psychology of Written Composition* (Hillsdale, NJ: Lawrence Erlbaum Associates, 1987).

[72] In the 1992 NAEP Writing Assessment, all tasks will include space for planning and procedures for analyzing the strategies students used.

A variety of questions asked students about the revising and editing strategies they used, including their attention to writing conventions (spelling, punctuation, grammar) as well as to the structure and organization of the text as a whole. Their responses are summarized in TABLE 12.5.

In both 1990 and 1984, the most frequently reported strategies involved the smallest units of text — such as changes in spelling, punctuation, or grammar — and the least frequently reported strategies were those that require extensive effort — such as moving sentences or paragraphs or rewriting most of a paper. At grade 11, there was a significant increase in the percentage of students who, when revising, took out parts of

TABLE 12.5

Trends in the Use of Specific Revising and Editing Strategies, 1984 to 1990

		PERCENTAGE OF STUDENTS REPORTING USE MORE THAN HALF THE TIME		
	Year	**Grade 4**	**Grade 8**	**Grade 11**
Correct spelling	1990	75 (1.2)	72 (1.1)	76 (1.2)
	1984	76 (1.7)	75 (1.7)	76 (2.4)
Correct punctuation	1990	62 (1.6)	66 (1.5)	70 (1.3)
	1984	64 (2.3)	69 (2.0)	70 (2.7)
Correct grammar	1990	55 (1.5)	64 (1.3)	72 (1.4)
	1984	50 (2.1)	65 (2.2)	70 (2.3)
Change words	1990	67 (1.6)	65 (1.3)	74 (1.5)
	1984	62 (1.8)	65 (2.3)	71 (2.5)
Add ideas or information	1990	62 (1.5)	61 (1.4)	71 (1.4)
	1984	59 (1.5)	60 (2.8)	70 (2.0)
Take out parts you don't like	1990	50 (1.5)	53 (1.3)	67 (1.2)
	1984	45 (2.0)	56 (2.2)	58 (3.0)*
Move sentences or paragraphs	1990	40 (1.4)	36 (1.6)	46 (1.3)
	1984	42 (1.8)	36 (2.0)	46 (2.6)
Rewrite most of the paper	1990	37 (1.3)	40 (1.2)	44 (1.2)
	1984	35 (1.6)	40 (1.8)	44 (2.6)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between each of the previous writing assessments and 1990. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

their papers that they did not like. Overall, there was little change over time in students' reported use of revising and editing strategies.

THE INSTRUCTIONAL CONTEXT To better understand the state of writing achievement in school-age children, it is useful to look at the various factors that influence them in school. Research on effective instructional practices in writing emphasizes that students should write frequently and for a wide range of purposes.[73] Also, researchers have found that an emphasis on mechanics and correctness in writing has little or no effect on the improvement of writing.[74] Instead, they call for teachers to respond to students' writing in ways that communicate high expectations for all students, that emphasize the students' authority over their texts, and that support students throughout the writing process.[75]

As a way of measuring trends in the writing students do in class and the ways in which teachers respond to this writing, several questions in the 1984 and 1990 assessments focused on the kinds and amount of writing that students did in school and on the kinds of responses that students received from their teachers. Trends in responses to these items provide a glimpse of the instruction students were receiving.

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[73] Donald H. Graves, *Writing: Teachers and Children at Work* (Portsmouth, NH: Heinemann Educational Books, 1983).

[74] George Hillocks, Jr., *Research on Written Composition: New Directions for Teaching* (Urbana, IL: ERIC Clearinghouse on Reading and Communication Skills, 1986).

[75] Sarah Warshauer Freedman, *Response to Student Writing* (Urbana, IL: National Council of Teachers of English, 1987).

TABLE 12.6 summarizes students' responses to a question about the kinds of writing they had done for English class the previous week. In 1990, at grade 4, there was an apparent increase in the percentage of students who reported writing stories, letters, reports, and essays, although changes over time were not statistically significant. At grade 8, there was a significant increase between 1984 and 1990 in the percentage of students who said they wrote stories for English class and for eleventh graders who reported writing poems.

TABLE 12.6

Trends in Types of Writing for English Class, 1984 to 1990

		PERCENTAGE OF STUDENTS REPORTING AT LEAST ONE PAPER WRITTEN FOR ENGLISH CLASS LAST WEEK		
	Year	**Grade 4**	**Grade 8**	**Grade 11**
Essay, compositon for theme	1990	24 (1.4)	45 (1.7)	64 (1.5)
	1984	19 (1.7)	41 (1.9)	60 (1.3)
Book report	1990	38 (1.8)	34 (1.8)	28 (1.5)
	1984	36 (1.4)	35 (1.7)	30 (1.6)
Other report	1990	31 (1.2)	30 (1.2)	39 (1.4)
	1984	27 (1.7)	27 (1.5)	38 (1.0)
Letter	1990	42 (1.7)	24 (1.2)	18 (0.9)
	1984	38 (1.5)	21 (1.3)	16 (1.1)
Story	1990	43 (1.7)	49 (1.9)	39 (1.1)
	1984	37 (1.9)	42 (1.6)*	40 (1.6)
Poem	1990	27 (1.4)	17 (1.1)	25 (1.1)
	1984	25 (1.6)	15 (1.3)	18 (0.9)*
Play	1990	14 (1.1)	12 (0.8)	14 (0.8)
	1984	13 (1.3)	10 (1.0)	13 (0.9)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between each of the previous writing assessments and 1990. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

Another set of questions asked students about the ways in which their teachers responded to their papers. The responses of students in grades 8 and 11 are summarized in TABLE 12.7.

TABLE 12.7

Trends in Teachers' Comments on Completed Papers, 1984 to 1990

	PERCENTAGE OF STUDENTS REPORTING THAT TEACHERS COMMENT ON ASPECT MORE THAN HALF THE TIME		
	Year	**Grade 8**	**Grade 11**
Follow directions	1990	42 (1.5)	29 (1.3)
	1984	42 (1.8)	30 (2.4)
Wrote enough	1990	35 (1.4)	29 (1.5)
	1984	33 (1.9)	26 (2.0)
Ideas in paper	1990	45 (1.8)	45 (1.3)
	1984	41 (1.8)	40 (1.8)*
Way ideas explained	1990	43 (1.6)	45 (1.6)
	1984	37 (1.7)*	40 (2.2)
Ways feelings expressed	1990	40 (1.5)	36 (1.4)
	1984	33 (2.2)*	31 (2.3)
Organization	1990	45 (1.6)	45 (1.5)
	1984	43 (2.0)	40 (2.1)
Words	1990	41 (1.5)	35 (1.6)
	1984	38 (2.3)	32 (1.6)
Spelling, punctuation, grammar	1990	51 (1.5)	45 (1.3)
	1984	51 (1.9)	45 (2.3)
Neatness and handwriting	1990	47 (1.4)	29 (1.5)
	1984	48 (2.2)	31 (2.7)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between each of the previous writing assessments and 1990. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

At grades 8 and 11, students' responses indicated little change in the extent or nature of teacher comments between 1984 and 1990. However, the changes that did occur from 1984 to 1990 indicate that more teachers are commenting on the ideas in and expressiveness of students' papers. There was a significant increase in the percentage of eighth graders who reported that their teachers commented on the way they expressed their feelings and the way they explained their ideas, as well as a significant increase in the percentage of eleventh graders who reported that their teachers commented on the ideas in their papers.

TABLE 12.8 summarizes student responses to a related series of questions asking about the types of feedback (oral or written) that they received from teachers on their writing.

TABLE 12.8
Trends in Teachers' Feedback on Writing, 1984 to 1990

	PERCENTAGE OF STUDENTS REPORTING TEACHERS PROVIDE TYPE OF FEEDBACK ALMOST EVERY TIME THEY WRITE		
	Year	**Grade 4**	**Grade 8**
Mark mistakes	1990	49 (1.2)	49 (1.5)
	1984	55 (1.4)*	60 (2.2)*
Write notes	1990	18 (0.9)	25 (1.7)
	1984	21 (1.6)	21 (1.8)
Point out what is well done	1990	33 (1.0)	25 (1.3)
	1984	35 (1.7)	21 (2.2)
Point out what is not well done	1990	32 (1.5)	34 (1.6)
	1984	35 (1.4)	34 (2.8)
Make suggestions for next time	1990	32 (1.1)	29 (1.5)
	1984	36 (1.6)	28 (2.2)
Show an interest in what you write	1990	40 (1.2)	33 (1.9)
	1984	40 (1.7)	29 (2.3)

* Statistically significant difference from 1990, as determined by an application of the Bonferroni procedure, where alpha equals .05 per set of comparisons between each of the previous writing assessments and 1990. The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

In general, there were few changes across time in the types of feedback students reported receiving from their teachers. At grades 4 and 8, there was a significant decline from 1984 to 1990 in the percentage of students who reported that their teachers marked mistakes.

SUMMARY Overall, students' reports on the value placed on writing, on how they managed the writing process, and on the instruction they received reflected few major changes between 1984 and 1990.

One change was an increase in eighth graders' personal and social uses of writing. More eighth graders in 1990 reported writing letters, stories, poems, and order forms than did so in 1984. Thus, more eighth graders experienced a greater variety of types of writing in 1990 than in 1984. In addition, the value eighth graders placed on writing appears to have increased from 1984 to 1990, with a higher percentage reporting that writing helps them understand themselves; that writing well improves one's chances of getting a good job; and that people who write well are more influential.

Students' responses to these series of questions also revealed some change in the comments teachers made on students' papers. Compared to 1984, the teachers of the eighth and eleventh graders sampled in 1990 were more likely to comment on the ideas expressed in students' papers. At the same time, fewer teachers of fourth and eighth graders' were marking mistakes.

Throughout the time period between 1984 and 1990, educators advocated changes in students' attitudes towards writing, in the kinds of writing students should do in and out of school, in the processes students should be engaged in as they write and in the ways teachers should respond to students' writing. NAEP data indicate that some positive changes have occurred in the value some students place on writing, on the variety of ways some students use writing, as well as in the nature of some teachers' responses to student writing. However, in 1990, as in 1984, few students engaged in overt planning strategies, when given the opportunity on one writing task, and fewer than half the students reported making major revisions to their papers (revisions that involved moving sentences or paragraphs, or more extensive rewriting).

APPENDICES

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PROCEDURAL APPENDIX

OVERVIEW OF PROCEDURES USED IN THE 1990 TREND ASSESSMENTS

SCIENCE, MATHEMATICS, READING, AND WRITING

This appendix provides more detailed information about the methods and procedures used in NAEP's 1990 trend assessments. The forthcoming *NAEP 1990 Technical Report* provides even more extensive information about these procedures.

OVERVIEW This NAEP trend report is based on six science assessments, five mathematics assessments, six reading assessments, and three writing assessments, with the most recent assessment in each of the four curriculum areas having been conducted during the 1989-90 school year. The composition of each of the four trend assessments is described below. An explanation of NAEP's various trend and cross-sectional assessments conducted in 1990 can be found in *The NAEP Guide*.[76]

SCIENCE. NAEP conducted trend assessments of the science achievement of in-school 9-, 13-, and 17-year-olds during the 1969-70, 1972-73, 1976-77, 1981-82, 1985-86, and 1989-90 school years. However, in the first assessment, 17-year-olds were assessed during the spring of the 1968-69 school year.

The science trend assessments have measured student achievement based on objectives developed by nationally representative panels of scientists, science educators, and concerned citizens. The objectives for each successive assessment were based on the framework used for the previous assessment with some revisions that reflected changes in content and trends in school science. Although changes were made from assessment to assessment, some questions were continued from one assessment to the next in order to measure trends across time. Since no new objectives were developed for the trend assessment in 1990, the questions which formed the 1986 trend assessment were used again in 1990, and also will be administered in 1992. In 1989-90, NAEP conducted two separate science assessments: the trend assessment based on the *1985-86 Science Objectives* that replicated procedures used in previous science assessments, and a newly developed science assessment based on a new set of objectives.[77] The results of the trend assessment are described in this report, and the results of the newly developed 1990 science assessment will be described in an upcoming report.

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[76] Ina V.S. Mullis, *The NAEP Guide: A Description of the Content and Methods of the 1990 and 1992 Assessments* (Princeton, NJ: National Assessment of Educational Progress, Educational Testing Service, 1990).

[77] *Science Objectives: 1985-86 Assessment* (Princeton, NJ: National Assessment of Educational Progress, Educational Testing Service, 1987).

Science Objectives: 1990 Assessment (Princeton, NJ: National Assessment of Educational Progress, Educational Testing Service, 1990).

The trend assessment contains 63 multiple-choice questions at age 9, 83 multiple-choice questions at age 13, and 82 multiple-choice questions at age 17. The questions cover a range of science content areas, including topics from the life sciences, physical sciences, and earth and space sciences, and assess students' abilities to understand basic scientific facts and principles, solve problems in scientific contexts, design and conduct experiments, interpret data and read tables and graphs, and understand the nature of science.

MATHEMATICS. NAEP has assessed the mathematics achievement of in-school 9-, 13-, and 17-year-olds five times: in the 1972-73 school year, in 1977-78, in 1981-82, in 1985-86, and in 1989-90. In 1990, NAEP conducted both a trend assessment replicating procedures established in 1973 and used in each mathematics trend assessment since then; and a newly developed mathematics assessment. The results and procedures used in the latter assessment are fully described in *The STATE of Mathematics Achievement.*[78] The trend assessment, however, forms the basis for the results and procedures discussed in this report.

Each trend assessment contained a range of constructed-response and multiple-choice questions measuring performance on sets of objectives developed by nationally representative panels of mathematics specialists, educators, measurement experts, and other interested parties.[79] However, no new development was conducted for the 1990 trend assessment, but rather a set of the 1986 questions was reassessed in 1990. This set of questions, which will also be readministered in 1992, contains 127 multiple-choice and 34 open-ended questions at age 9, 158 multiple-choice and 56 open-ended questions at age 13, and 231 multiple-choice and 56 open-ended questions at age 17.

The questions covered a range of content, including numbers and operations, measurement, geometry, and algebra. The process areas included knowledge, skills, application, and problem solving.

READING. NAEP has assessed students' reading performance at ages 9, 13, and 17 in six national reading assessments conducted during the school years ending in 1971, 1975, 1980, 1984, 1988, and 1990.[80]

The reading tasks included in the trend assessment asked students to read and answer questions based on a variety of materials, including informational passages, literary text, and documents. Although some questions required students to provide written responses, most questions were multiple choice and were designed to assess students' ability to locate specific information, make inferences based on information in two or more parts of a passage, or identify the main idea in a passage. For the most part, these questions measured students' ability to read either for specific information or for general understanding.

[78] Ina V.S. Mullis, John A. Dossey, Eugene H. Owen, and Gary W. Phillips, *The STATE of Mathematics Achievement: NAEP's 1990 Assessment of the Nation and the Trial Assessment of the States* (Washington, DC: National Center for Education Statistics, U.S. Department of Education, 1991).

[79] *Math Objectives: 1985-86 Assessment* (Princeton, NJ: National Assessment of Educational Progress, Educational Testing Service, 1986).

[80] NAEP also conducted a reading assessment in 1986. However, when they were first produced, the NAEP 1986 estimates of students' reading proficiency appeared anomalous, and the trend results were not disseminated to the general public. Concern about these apparently anomalous results prompted a thorough investigation of the NAEP technology by the ETS/NAEP staff, which was reported in NAEP 1985-86 *Reading Anomaly: A Technical Report*, and by an independent technical review panel convened by NCES, whose findings were summarized in *Report of the NAEP Technical Review Panel on the 1986 Reading Anomaly, the Accuracy of NAEP Trends, and Issues Raised by State-Level NAEP Comparisons.* As part of the 1988 assessment, NAEP conducted a study to provide further information about the 1986 reading anomaly. The analyses of the data collected in the study revealed some, but not all, of the reasons for the unusual assessment results in 1986. Further information on this issue is available in *Disentangling the NAEP 1985-86 Reading Anomaly: A Technical Report* (Princeton, NJ: Educational Testing Service, National Assessment of Educational Progress, 1989).

Although the reading assessments conducted through the 1970s underwent some changes from administration to administration, the set of reading passages and items included in the trend assessments has been kept essentially constant since 1984, and most closely reflects the objectives developed for that assessment.[81] The reading trend assessment administered at age 9 included 54 passages and 118 questions, including five that required students to construct written responses. Thirteen-year-olds were asked 94 questions, eight of them requiring constructed responses, pertaining to 40 passages. Seventeen-year-olds were asked 112 questions, nine of them requiring constructed responses, pertaining to 34 passages.

The results from a second reading assessment also conducted in 1990 reflect the objectives developed for that assessment and will be described in a forthcoming report.[82] While the trend assessment will be readministered in 1992 to provide information about changes across time, the materials in the second reading assessment will be replaced in 1992. For the 1992 national assessments at grades 4, 8, and 12 and The Trial State Assessment in reading at grade 4, NAEP has developed a totally new set of reading tasks, the majority of which require students to write their responses, based on objectives created under the auspices of the National Assessment Governing Board and its contractor, the Council of Chief State School Officers.

WRITING. This report is based on the 1983-84, 1987-88, and 1989-90 writing assessments of students in grades 4, 8, and 11. In all three assessments, the same tasks were included verbatim and were administered in the same manner to comparable samples of students.[83] The writing tasks and background questions were designed to measure aspects of writing performance and related factors that were designated as important by a nationally representative panel of writing specialists, educators, and concerned citizens. The primary objective of the trend assessment was to measure students' ability to write for various purposes; related objectives were to evaluate the extent to which students managed the writing process, controlled the forms of written language, and valued writing.[84] At each grade, students were administered six different writing tasks.

THE DESIGN OF THE SCIENCE AND MATHEMATICS TREND ASSESSMENTS

At each of the three ages assessed, both the science and mathematics trend assessments consisted of three different 15-minute segments or "blocks" of content questions, each also containing a small set of background questions. The background questions pertained to students experiences and instruction with the particular subject area being assessed (i.e., either science or mathematics).

The blocks were assembled three to a booklet together with a background questionnaire that was common to all booklets. This questionnaire included questions about demographic information as well as home environment.

At ages 9 and 13, the blocks were placed in three booklets, each containing one block of mathematics questions, one block of science questions, and one block of reading questions. This combination preserved the context effects of previous assessments. To replicate past procedures, at age 17, two booklets were used. One contained two mathematics blocks and one science block, while the other contained two science blocks and one mathematics block.

At all three ages, the science and mathematics questions were administered using a paced audiotape. The tape recording that accompanied the booklets standardized timing and was intended to help students with any difficulty they might have in reading the questions. Thus, in an administration session, all students were being paced through the same booklet.

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[81] *Reading Objectives: 1983-84 Assessment* (Princeton, NJ: National Assessment of Educational Progress, Educational Testing Service, 1984).

[82] *Reading Objectives: 1990 Assessment* (Princeton, NJ: National Assessment of Educational Progress, Educational Testing Service, 1989).

[83] For previous trends on a different set of writing prompts see Arthur N. Applebee, Judith A. Langer, and Ina V.S. Mullis, *Writing Trends Across the Decade: 1974-84* (Princeton, NJ: National Assessment of Educational Progress, Educational Testing Service, 1986).

[84] *Writing Objectives: 1988 Assessment* (Princeton, NJ: National Assessment of Educational Progress, Educational Testing Service, 1987).

THE DESIGN OF THE READING AND WRITING TREND ASSESSMENTS

The reading trend assessment consisted of ten 15-minute blocks of reading passages and questions at each of three age/grade levels, while the writing trend assessment included five 15-minute blocks. Each writing block contained one prompt, except one block which contained two short prompts, for a total of six prompts. In addition, each content block contained a short set of background questions. The background questions in the reading blocks pertained to students' reading habits and experiences, while those in the writing blocks asked about students' writing practices, instruction, and attitudes.

In keeping with procedures used in previous reading and writing trend assessments, the reading and writing blocks were assembled into six booklets per each age/grade assessed, with each pair of reading or writing blocks appearing in one of the booklets. Each student participating in the reading and writing assessments received a booklet containing three blocks of questions as well as a six-minute section of background questions about demographic information and the students' home environment.

SAMPLING AND DATA COLLECTION

Sampling and data collection activities for the 1990 trend assessments were conducted by Westat, Inc. Based on procedures used since the inception of NAEP, the data collection schedule was 13-year-olds/eighth graders in the fall (October to December), 9-year-olds/fourth graders in the winter (January to mid-March), and 17-year-olds/eleventh graders in the spring (mid-March to May). Although only 9-, 13-, and 17-year-olds were assessed in science and mathematics, both age- and grade-eligible students were assessed in reading and writing. Age eligibility was defined by calendar year for 9- and 13-year-olds, while the birth date range for 17-year-olds was from the preceding October through September of the calendar year.

As with all NAEP national assessments, students attending both public and private schools were selected for participation based on a stratified, three-stage sampling plan. The first and second stages included defining geographic primary sampling units (PSUs), which are typically groups of contiguous counties, but sometimes a single county; classifying the PSUs into strata defined by region and community type; and randomly selecting schools, both public and private, within each PSU selected at the first stage. The third stage involved randomly selecting students within a school for participation. Some students selected (fewer than 6 percent) were excluded because of limited English proficiency or severe disability.

The student sample sizes for the trend assessments as well as the school and student participation rates are presented in the following tables. Because students within schools were randomly assigned to either mathematics/science or reading/writing assessment sessions subsequent to their selection for participation in the 1990 assessments, the school and student participation rates shown are for all four subject areas combined. However, based on the sampling design, these rates are also the best estimates for each individual subject area. They are included in the individual tables for each subject area for convenience in comparing across assessment years. For assessments conducted prior to 1984, the school and student participation rates were obtained from the *Public Use Data Tape User Guides*. Figures for more recent assessments then were obtained from the *Reports on the NAEP Field Operation and Data Collection Activities*, prepared by Westat, Inc. Although sampled schools that refused to participate were replaced, school cooperation rates were computed based on the schools originally selected for participation in the assessments. The student completion rates represent the percentage of students assessed of those invited to be assessed, including in follow-up sessions when necessary.

TABLE A.1
Student Sample Sizes for Science Trend Scaling

	1977	1982	1986	1990
Age 9	17,345	1,960	6,932	6,235
Age 13	25,653	7,873	6,200	6,649
Age 17 (in school)	31,436	7,974	3,868	4,411
Total	74,434	17,817	17,000	17,295

TABLE A.2
Science Trend School Cooperation and Student Response Rates

	AGE	PERCENTAGE OF SCHOOLS PARTICIPATING	PERCENTAGE OF STUDENT COMPLETION
1970	9	—	88.0
	13	—	85.6
	17	—	74.5
1973	9	93.9	91.0
	13	93.8	84.6
	17	92.4	73.6
1977	9	91.5	88.6
	13	91.3	86.2
	17	89.5	73.1
1982	9	88.3	90.5
	13	89.2	85.5
	17	86.5	74.2
1986	9	88.7	92.9
	13	88.1	89.2
	17	82.7	78.9
1990	9	87.0	92.5
	13	89.0	90.2
	17	79.0	82.1

TABLE A.3

Student Sample Sizes for Mathematics Trend Scaling

	1978	1982	1986	1990
Age 9	14,752	12,038	6,932	6,235
Age 13	24,209	15,758	6,200	6,649
Age 17 (in school)	26,756	16,319	3,868	4,411
Total	65,717	44,115	17,000	17,295

TABLE A.4

Mathematics Trend School Cooperation and Student Response Rates

	AGE	PERCENTAGE OF SCHOOLS PARTICIPATING	PERCENTAGE OF STUDENT COMPLETION
1973	9	93.9	90.9
	13	93.8	84.2
	17	92.4	73.5
1978	9	91.5	87.2
	13	91.5	85.2
	17	89.5	73.2
1982	9	88.3	90.5
	13	89.2	85.5
	17	86.5	74.2
1986	9	88.7	92.9
	13	88.1	89.2
	17	82.7	78.9
1990	9	87.0	92.5
	13	89.0	90.2
	17	79.0	82.1

TABLE A.5
Student Sample Sizes for Reading Trend Scaling

	1971	1975	1980	1984	1988	1990
Age 9	23,201	21,697	21,159	22,291	3,782	4,268
Age 13	25,545	21,393	22,330	22,693	4,005	4,609
Age 17 (in school)	23,661	19,624	18,103	25,193	3,652	2,689
Total	72,407	62,714	61,592	70,177	11,439	11,566

TABLE A.6
Reading Trend School Cooperation and Student Response Rates

	AGE	PERCENTAGE OF SCHOOLS PARTICIPATING	PERCENTAGE OF STUDENT COMPLETION
1971	9	92.5	90.7
	13	92.0	88.2
	17	90.5	75.2
1975	9	93.9	87.5
	13	92.8	83.7
	17	91.0	69.7
1980	9	94.5	90.1
	13	93.2	85.9
	17	90.5	78.0
1984	9	88.6	92.5
	13	90.3	90.3
	17	83.9	82.2
1988	9	87.2	92.3
	13	92.7	88.2
	17	78.1	77.4
1990	9	87.0	92.5
	13	89.0	90.2
	17	79.0	82.1

TABLE A.7

Sample Sizes for the Writing Trend Assessment by Task and Scoring Method

		1984			1988			1990		
		Grade			Grade			Grade		
Writing Task	**Scoring Method**	**4**	**8**	**11**	**4**	**8**	**11**	**4**	**8**	**11**
Informative										
Plants	Primary	656	—	—	1285	—	—	1416	—	—
XYZ Company	Primary	544	616	—	1152	1334	—	1288	1489	—
Appleby House	Primary	530	588	599	925	1256	1041	1111	1396	1277
Food on the Frontier	Primary	—	603	629	—	1339	1212	—	1503	1401
Food on the Frontier	Holistic	—	2233	2373	—	1339	1209	—	1500	1399
Job Application	Primary	—	—	603	—	—	1169	—	—	1424
Persuasive										
Spaceship	Primary	611	—	—	1258	—	—	1367	—	—
Spaceship	Holistic	2025	—	—	1256	—	—	1359	—	—
Spaceship	Mechanics	—	—	—	481	—	—	—	—	—
Radio Station	Primary	585	612	—	1234	1364	—	1386	1512	—
Dissecting Frogs	Primary	—	641	—	—	1356	—	—	1518	—
Rec. Opportunities	Primary	—	494	521	—	1372	1242	—	1498	1415
Rec. Opportunities	Holistic	—	2228	2354	—	1364	1238	—	1496	1411
Rec. Opportunities	Mechanics	—	473	517	—	516	497	—	—	—
Space Program	Primary	—	—	632	—	—	1195	—	—	1451
Bike Lane	Primary	—	—	636	—	—	1178	—	—	1424
Imaginative										
Flashlight	Primary	609	—	—	614	—	—	702	—	—
Flashlight	Holistic	2015	—	—	611	—	—	697	—	—

TABLE A.8

Writing Trend School Cooperation and Student Response Rates

	GRADE	PERCENTAGE OF SCHOOLS PARTIPATING	PERCENTAGE OF STUDENT COMPLETION
1984	4	88.6	92.5
	8	90.3	90.3
	11	83.9	82.2
1988	4	87.2	92.3
	8	92.7	88.2
	11	78.1	77.4
1990	4	87.0	92.5
	8	89.0	90.2
	11	79.0	82.1

SCORING THE BOOKLETS Materials from NAEP's 1990 assessments, including the trend assessments, were shipped to National Computer Systems (NCS) in Iowa City, Iowa, for processing. Receipt and quality control were managed through a sophisticated bar-coding and tracking system. After all appropriate materials were received from a school, they were forwarded to the professional scoring area, where the responses to the constructed-response questions were evaluated by trained staff using guidelines prepared by NAEP. Each constructed-response question had a unique scoring guide that defined the criteria to be used in evaluating students' responses. Subsequent to the professional scoring, the booklets were scanned, and all information was transcribed to the NAEP database at ETS. Each processing activity was conducted with rigorous quality control. An overview of the professional scoring for mathematics, reading, and writing follows (no constructed-response questions were scored for science).

SCORING THE MATHEMATICS CONSTRUCTED-RESPONSE QUESTIONS Most of the constructed-response mathematics trend items were scored on a right/wrong basis. The scoring guides identified the correct or acceptable answers for each item in each block. The scores for these items included a 0 for no response, a 1 for a correct answer, or a 2 for an incorrect or " I don't know" response. Because of the straightforward nature of the scoring, lengthy training was not required. In an orientation period, the readers were trained to follow the procedures for scoring the mathematics items and given an opportunity to become familiar with the scoring guides, which listed the correct answer for the items in each of the blocks.

During the scoring, every tenth booklet in a session was scored by a second reader to provide a quality check. These quality checks were recorded on a separate sheet with the few discrepancies noted, and the scores were corrected.

For the most part, this entailed providing a score because one had not been coded. In total, 374,579 answers were read and classified, including 110,752 responses at age 9, 109,682 at age 13, and 154,145 at age 17.

SCORING THE READING CONSTRUCTED-RESPONSE QUESTIONS The 1990 reading trend assessment included five questions at age 9 where students were required to construct written responses, eight such questions at age 13, and nine such questions at age 17. Some of the questions were administered to more than one age group of students.

The scoring guides for the constructed-response reading questions focused on students' ability to perform various reading tasks—for example, identifying the author's message or mood and substantiating their interpretation, making predictions based on given details, supporting an interpretation, and comparing and contrasting information.

The guides for the reading items varied somewhat, but typically included the distribution of score points shown below.

Outline for Scoring of Constructed-Response Reading Trend Assessment Items

SCORE	
4	**ELABORATED REFERENCE OR INTERPRETATION.** These responses exceeded the requirements of the task by including illustrative examples or details and demonstrating a high level of cohesiveness.
3	**SATISFACTORY REFERENCE OR INTERPRETATION.** These responses identified at least two relevant examples or reasons to support a given interpretation.
2	**MINIMAL REFERENCE OR INTERPRETATION.** These responses did not provide evidence to support a stated interpretation.
1	**UNSATISFACTORY REFERENCE OR INTERPRETATION.** These responses did not provide an interpretation, but instead digressed or avoided the task.
0, 7, 8, 9	These responses were, respectively, blank, indecipherable, completely off-task, or included a statement to the effect that the student did not know how to do the task. (In the analysis, scores of 7, 8, and 9 were collapsed into the score point of 9).

Some of the guides included secondary scores, which typically involved categorizing the kind of evidence or details the student used as support for an interpretation. The document literacy items, most of which required short answers, were scored on a right/wrong basis. The number of open-ended reading responses scored included 9,217 at age 9, 15,828 at age 13, and 16,853 at age 17.

The training program for the trend assessment was carried out on all the questions given to one age group at a time. Because the purpose of the open-ended reading scoring was to measure trends from the 1984 assessment, preparation for training included rereading hundreds of 1984 responses and bundling them for training purposes. In order to ensure continuity with the past scoring of the trend items, at least half of the sample papers in the training sets were taken from the 1984 training sets, and previously scored 1984 booklets were masked to ensure that scoring for training and the subsequent trend reliability scoring would be done without knowledge of the previous scores given.

The actual training was conducted by ETS staff assisted by NCS's scoring director and team leaders. Training began with each reader receiving a photocopied packet of materials consisting of a scoring guide, a set of 15 to 20 scored samples, and an additional 20 to 40 response samples to be scored. The trainers reviewed the scoring guide, explained all the applicable score points, and elaborated on the rationale used to arrive at a particular score. The readers then reviewed the 15 to 20 scored samples, as the trainers clarified and elaborated on the scoring guide. After this explanation, the additional samples were scored and discussed until the readers were in agreement. If necessary, additional packets of 1984 responses were used for practice scoring.

As a further step to achieve reliability with 1984, a 25 percent sample of the 1984 responses was scored on separate scoring sheets following the formal training session. These sheets were key entered, and a computerized report was generated comparing the new scores with those assigned in 1984. After some further discussion, scoring of the 1990 responses began. Two reliability studies were conducted as part of this scoring. For the 1990 material, 25 percent of the open-ended responses were scored by a second reader to produce interreader reliability statistics. In addition, a trend reliability study was conducted by rereading 20 percent of the 1984 responses. The reliability information is shown in TABLE A.9.

TABLE A.9

Reading Trend Assessment Percent Exact Agreement Between Readers

	1984 PAPERS RESCORED IN 1990		1990 PAPERS SCORED TWICE	
Age	Mean Percent Agreement	Range of Agreement	Mean Percent Agreement	Range of Agreement
9	92.6	89.6 - 95.7	81.1	70.9 - 87.3
13	79.0	70.7 - 85.2	70.1	64.5 - 77.4
17	93.5	90.7 - 97.0	78.6	71.3 - 83.5

NOTE: The reading scoring was generally based on 5 scoring categories.

SCORING THE WRITING TASKS

PRIMARY TRAIT SCORING. A primary trait scoring guide was developed for each writing task to focus raters' attention on how successfully students' responses accomplished the task set forth in the prompt. As illustrated in the introduction to Part IV of this report, the guides typically defined five levels of task accomplishment — not rated, unsatisfactory, minimal, adequate, and elaborated — based on the rhetorical demands of the task. (A few of the scoring guides did not define an "elaborated" category as it was not appropriate to do so given the nature of the task.)

Because the results for the 1984 and 1988 trend assessments were based on a scoring of both 1984 and 1988 papers conducted in 1988, the undertaking for writing trend scoring in 1990 involved replicating the standards used in 1988. The procedure for training readers proceeded as outlined above for the reading trend assessment scoring, except that the writing scorers were trained using 1988 sample papers and practiced with a 25 percent sample of 1988 writing responses. As part of the scoring, two reliability studies were conducted. For the 1990 responses, 25 percent of the papers were scored by a second reader to produce interrater reliability statistics. In addition, a trend reliability study was conducted to ensure that the scoring procedures were consistent with those used in 1988. The results of these studies are presented in TABLE A.10.

TABLE A.10

Writing Trend Assessment Percent Exact Agreement Between Readers for Primary Trait Scoring

	1988 PAPERS RESCORED IN 1990		1990 PAPERS SCORED TWICE	
Grade	**Mean Percent Agreement**	**Range of Agreement**	**Mean Percent Agreement**	**Range of Agreement**
Grade 4	85.0	76.9 - 91.1	82.5	75.2 - 92.1
Grade 8	82.9	75.4 - 92.6	76.4	66.1 - 86.8
Grade 12	78.1	71.6 - 85.5	77.8	71.8 - 84.6

NOTE: The primary trait scoring was based on 5 scoring categories.

HOLISTIC SCORING. To offer another perspective on students' writing abilities, selected tasks included in the trend assessment were scored holistically for overall fluency (i.e., a global view of the ideas, language facility organization, mechanics, and syntax of each paper taken as a whole). As previously noted, these tasks were "Spaceship" and "Flashlight" at grade 4, and "Recreation Opportunities" and "Food on the Frontier" at grades 8 and 11. Trained readers evaluated the relative fluency of students' writing on a 6-point scale. A small percentage of papers — such as those that were blank or undecipherable — were not rated.

The holistic scale was anchored by a chief reader and assistant chief reader chosen for their expertise in holistic scoring. For example, the chief reader was also the chief reader for the 1988 NAEP holistic scoring session. They, together with the table leaders and ETS staff members, studied the pool of student responses to select papers that represented each point on the holistic scale, and then used these sample papers to train the raters. In addition, for each item, a random sample of 50 papers from across the three assessment years was drawn and evaluated by the group for use as practice papers in the training. Using the sample papers as a guide, the readers were asked to determine whether papers corresponded to the top half or the bottom half of the holistic scale and then to make finer distinctions between adjacent points on the scale. Because the emphasis of the holistic scoring was to detect trends across time at each of the three grade levels assessed, where a task was given at more than one grade level, responses were rated separately for each grade. A training session preceded the scoring of responses to each task at each grade level.

Because student papers are evaluated relative to one another in holistic scoring — rather than against specific criteria, as with primary trait scoring — the distribution of scores for the total sample of papers should be approximately normal, with scores evenly distributed around the center of the scale. To detect changes in writing fluency across time at each grade level, papers from the 1984, 1988, and 1990 assessments were randomly mixed prior to scoring. Thus, if more papers from one or another assessment were judged to be in the "top half" of the scale, the results would indicate changes across time in overall writing fluency. Twenty percent of the papers scored holistically were scored again by a second reader to provide information on interrater scoring agreement. These data are presented in TABLE A.11.

TABLE A.11

Writing Trend Assessment Percent Agreement for Adjacent Scores for Holistic Scoring of the 1984, 1988, and 1990 Papers Conducted in 1990

	1990 HOLISTIC SCORING		
	4	**8**	**11**
Spaceship	99.8	—	—
Flashlight	92.9	—	—
Recreation Opportunities	—	95.7	95.0
Food on the Frontier	—	92.1	91.0

NOTE: The holistic scoring was based on 7 scoring categories. Adjacent scores did not differ by more than category.

Since certain writing items included in the writing trend assessments were submitted to both holistic and primary trait scoring, it is also possible to examine the relationship between the two sets of scores. As shown in TABLE A.12, the correlations range from .42 to .72. While the two scoring measures are clearly related, it is evident that they capture somewhat different aspects of writing performance. The primary trait score is closely tied to the features of specific writing tasks, providing a measure of students' success in accomplishing the assigned purpose of the writing. Alternatively, the holistic score provides a general measure of writing fluency, since the impression marks that raters give are affected by writers' attention to organization, adherence to the conventions of written English, word choice, handwriting, and quality of ideas.

TABLE A.12

Correlation Coefficients Between Primary Trait and Holistic Scores

	1984 PAPERS			1988 PAPERS			1990 PAPERS		
	4	**8**	**11**	**4**	**8**	**11**	**4**	**8**	**11**
Spaceship	.68	—	—	.72	—	—	71	—	—
Flashlight	.62	—	—	.64	—	—	.67	—	—
Recreation Opportunities	—	.42	.46	—	.49	.53	—	.43	.46
Food on the Frontier	—	.45	.53	—	.48	.43	—	.52	.49

MECHANICS SCORING. To provide for an examination of trends in students' control of the conventions of written English, NAEP evaluated a random subsample of the 1990 writing responses using the mechanics scoring criteria it used to evaluate writing responses from the 1984 and 1988 assessments.[85] One task at each grade level was selected for the mechanics scoring; these tasks were "Spaceship" at grade 4 and "Recreation Opportunities" at grades 8 and 11. A random probability sample of approximately 600 responses to each item at each grade level was selected for evaluation. To ensure that the comparisons between Black and White students were reasonably precise, Black students were oversampled. Readers were trained by practicing on a 10 percent sample of the 1988 papers. Another 10 percent sample of essays previously scored for mechanics from the 1984 and 1988 assessments were rescored for reliability. A comparison of the 1990 data with the original scores indicated a between-year reliability ranging from .86 to .89 across the three grade levels.

In the mechanics scoring, each response was analyzed for a variety of aspects of spelling, punctuation, grammar, word choice, and syntax by English teachers who had been trained in the use of detailed criteria. The entire text of the scored papers, with the scoring marks, was then entered into a computer-readable database to provide for the subsequent analyses.

An outline of the features of writing mechanics included in the scoring and analysis is provided below.

I. SENTENCE TYPES

1. **Simple** — A sentence that contains a subject and a verb. It may also have an object, subject complement, phrase, appositive, nominative absolute, or verbal. Also, a word group used in dialogue, for emphasis, or as an exclamation that is not an independent clause.
2. **Compound** — A sentence containing two or more simple sentences joined by something other than a comma.
3. **Complex (and compound-complex)** — A sentence that contains at least one independent clause and one dependent clause.
4. **Run-On Sentence**
    a. Fused — A sentence containing two or more independent clauses with no punctuation or conjunction separating them.
    b. On and on — A sentence consisting of four or more independent clauses strung together with conjunctions.
    c. Comma splice — A sentence containing two or more independent clauses separated by a comma instead of a semicolon or a coordinating conjunction.
5. **Fragment** — A word group, other than an independent clause, written and punctuated as a sentence.

II. FAULTY SENTENCE CONSTRUCTION

(These scores are in addition to the sentence types.)

1. **Agreement Error** — A sentence where at least one of the following is present: subject/verb do not agree, pronoun/antecedent do not agree, noun/modifier do not agree, subject/object pronoun is misused, or verb tense shifts.
2. **Awkward Sentence** (The awkward categories are listed in order of category precedence, since only one score was given to a sentence.)
    a. Faulty parallelism — A parallel construction that is semantically or structurally dysfunctional.

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[85] Arthur N. Applebee, Judith A. Langer, and Ina V.S. Mullis, *Grammar, Punctuation, and Spelling: Controlling the Conventions of Written English* (Princeton, NJ: Educational Testing Service, National Assessment of Educational Progress, 1987).

b. Unclear pronoun reference — A pronoun's antecedent is unclear.

c. Illogical construction — Faulty modification or a dangling modifier or a functionally misarranged or misproportioned sentence.

d. Other dysfunctions — A sentence containing an omitted or extra word or a split construction that definitely detracts from readability.

III. PUNCTUATION ERRORS

Every error of commission and error of omission was coded for commas, dashes, quotation marks, semicolons, apostrophes, and end marks. The most informal rules of usage were used, with the writer receiving the benefit of any doubt.

IV. WORD-LEVEL CONVENTIONS

1. **Word Choice** — The writer needs a word that is different from the one written. This category also includes attempts at a verb, adjective, or adverb form that is nonexistent or unacceptable.
2. **Spelling** — In addition to a misspelling, this category includes word-division errors at the end of a line, two words written as one, one word written as two, superfluous plurals, and groups of distinguishable letters that do not make a legitimate word.
3. **Capitalization** — A word is given a capitalization error score if the first word in a sentence is not capitalized, if a proper noun or adjective within a sentence is not capitalized, and if the pronoun "I" is not capitalized.

The mechanics scoring was designed to allow the writer as much flexibility as possible under existing conventions of correct writing; consequently, any time two authorities on mechanics disagreed, the more informal interpretation was used.

Because the papers were entered into a computer-readable database, the number of words per paper, number of words per sentence, and number of letters per word were tabulated by computer.

WEIGHTING THE DATA. After the assessment information had been compiled in the NAEP database, the data were weighted according to the population structure. The weighting for the samples reflected the probability of selection for each student as a result of the sampling design, adjusted for nonresponse. Through poststratification, the weighting assured that the representation of certain subpopulations corresponded to figures from the U.S. Census and the Current Population Survey.

DATA ANALYSIS AND IRT SCALING FOR SCIENCE, MATHEMATICS, AND READING Analyses were then conducted to determine the percentages of students who gave various responses to each cognitive and background question. Item response theory (IRT) was used to estimate average proficiency for the nation and various subgroups of interest within the nation.

IRT models the probability of answering an item correctly as a mathematical function of proficiency or skill. The main purpose of IRT analysis is to provide a common scale on which performance can be compared across groups, such as those defined by age, assessment year, or subpopulations (e.g., race/ethnicity or gender).

Because of the design used by NAEP in the trend assessments conducted since 1983-84, students do not receive enough questions about a specific topic to provide reliable information about individual performance. Traditional test scores for individual students, even those based on IRT, would contribute to misleading estimates of population characteristics, such as subgroup means and percentages of students at or above a certain proficiency level. Instead, NAEP constructs sets of plausible values designed to represent the distribution of proficiency in the population. A plausible value for an individual is not a scale score for that individual but may be regarded as a representative value from the distribution of potential scale scores for all students in the population with similar characteristics and identical patterns of item response. Statistics describing performance on the NAEP proficiency scale are based on these plausible values. They estimate values that would have been obtained had individual proficiencies been observed — that is, had each student responded to a sufficient number of cognitive items so that proficiency could be precisely estimated.

The reading trend scale was constructed based on the 1983-84 assessment and the trend scaling included all previous reading assessments. The science and mathematics trend scales were developed based on the 1986 science and mathematics assessments, respectively. The initial trend scaling, however, did not include the 1969-70 or 1973 science assessments, or the 1973 mathematics assessment. To provide a link to these early assessments for the nation and subgroups defined by race/ethnicity, gender, and region at each of three age levels, estimates of mean proficiency levels were extrapolated from previous analyses.

These estimates were obtained by assuming that the relationship within a given age level between the logit of a subgroup's mean p-value (i.e., mean proportion correct) and its respective proficiency mean was linear and that the same line held for all assessment years and for all subgroups within the age level. Under this assumption, the between-year difference of the mean proficiency values of a subgroup for a pair of assessment years is equal to a constant (B) times the between-year difference of the logits of the mean p-values of that subgroup for the same two years. For each age level, a mean p-value estimated using a common set of items was available for adjacent assessments. For science, these assessments included 1970 to 1973, 1973 to 1977, and 1977 to 1982. The adjacent assessments used for mathematics were 1973, 1977, and 1982. Then, using science as an example, the constant B was estimated by a regression (through the origin) of the difference between proficiency means in 1978 and 1982 on the corresponding difference between the logits of the mean p-values for these two years. All subgroups in a given age were included in the regression. For example, the estimate of the 1973 proficiency mean for a subgroup was then obtained as the sum of the 1977 subgroup mean proficiency and B times the difference between the logits of the 1973 and 1977 subgroup mean p-values (for items common to 1973 and 1977). The same procedure was used for extrapolating the 1973 mean p-value results on to the mathematics IRT scale. The only difference was that the mean p-value results were for the 1973, 1978, and 1982 assessments, rather than for the 1973, 1977, and 1982 assessments. For science, however, results were extrapolated for two assessments. Therefore, after estimating the 1973 subgroup mean proficiency, the 1970 mean proficiency for the subgroup was estimated by the 1973 mean proficiency estimate plus B times the difference between the logits of the 1970 and 1973 subgroup mean p-values (for items common to 1970 and 1973).

THE SCALE ANCHORING ANALYSIS

The reading scale anchoring was conducted on the basis of the 1983-84 assessment, and the scale anchoring for mathematics and science trend reporting on the basis of the 1986 assessments. NAEP's scale anchoring is grounded in an empirical process whereby the scaled assessment results are analyzed to delineate sets of items that discriminate between adjacent performance levels on the scale. For the science, mathematics, and reading trend scales, these levels are 150, 200, 250, 300, and 350. For these five levels, items were identified that were likely to be answered correctly by students performing at a particular level on the scale and much less likely to be answered correctly by students performing at the next lower level.

The guidelines used to select such items were that students at any given level would have at least a 65 to 80 percent (but often higher) probability of success with the questions, while the students at the next lower level would have a much lower probability of success, that is, lower than 50 percent, and using the criterion that the difference in probabilities exceeded 30 percent between adjacent levels. For each curriculum area, subject-matter specialists examined these empirically selected item sets and used their professional judgment to characterize each proficiency level.

ANALYSIS OF WRITING ACHIEVEMENT

As in science, mathematics, and reading, analyses were conducted to determine the percentage of students who gave various responses to each writing cognitive and background question. However, unlike the other subjects areas, a mean writing score procedure was used instead of the IRT procedure to produce overall estimates of writing achievement.

The mean writing score procedure calculates the mean score for each cognitive item in the subgroup of interest, and then calculates the mean across all cognitive items. This mean is then multiplied by 100 to convert it to a 0 to 400 metric. For example, the mean writing score for fourth-grade students in 1990 was 183. If one averages the six corresponding primary trait mean scores at grade 4 given in the data appendix, one obtains (2.12+1.80+1.88+1.59+1.86+1.76)/6, which is equal to 1.83. Multiplying by 100 results in the mean writing achievement of 183 at grade 4.

NAEP REPORTING GROUPS This report contains results for the nation and groups of students within the nation defined by shared characteristics. The definitions for subgroups as defined by race/ethnicity, size and type of community, parents' education level, gender, and region follow.

Race/Ethnicity. Results are presented for students of different racial/ethnic groups according to the following mutually exclusive categories: White, Black, Hispanic, Asian/Pacific Islander, and American Indian (including Alaskan Native). Some racial/ethnic results are not reported separately because there were too few students in the classification. However, the data for all students, regardless of whether their racial/ethnic group was reported separately, were included in computing the overall national results.

Type of Community. Results are provided for four mutually exclusive community types — advantaged urban, disadvantaged urban, extreme rural, and other — as described below.

Advantaged Urban: Students in this group reside in metropolitan statistical areas and attend schools where a high proportion of the students' parents are in professional or managerial positions.

Disadvantaged Urban: Students in this group reside in metropolitan statistical areas and attend schools where a high proportion of the students' parents are on welfare or are not regularly employed.

Extreme Rural: Students in this group do not reside in metropolitan statistical areas. They attend schools in areas with a population below 10,000 where many of the students' parents are farmers or farm workers.

Other: Students in the "Other" category attend schools in areas other than those defined as advantaged urban, disadvantaged urban, or extreme rural. The information about parents' occupation was obtained from the Principal's Questionnaire completed by each sampled school.

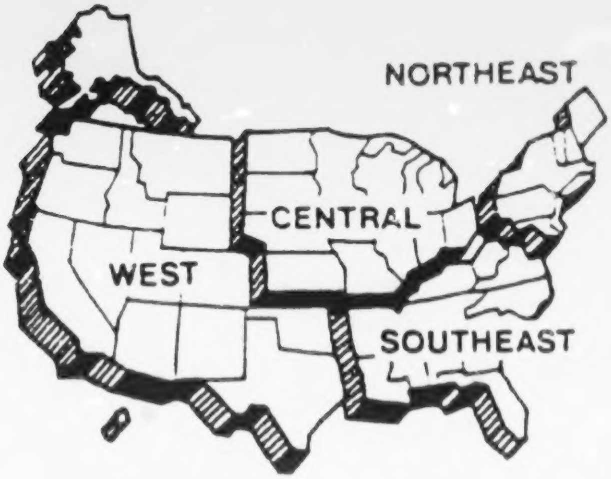
Parents' Education Level. Students were asked to indicate the extent of schooling for each of their parents — did not finish high school, graduated from high school, had some education after high school, or graduated from college. The response indicating the higher level of education for either parent was selected for reporting.

Gender. Results are reported separately for males and females. Gender was reported by the student.

Region. The United States has been divided into four regions: Northeast, Southeast, Central, and West. States in each region are shown on the map on the following page.

ESTIMATING VARIABILITY Because the statistics presented in this report are estimates of group and subgroup performance based on samples of students, rather than the values that could be calculated if every student in the nation answered every question, it is important to have measures of the degree of uncertainty of the estimates. In addition to providing estimates of percentages of students and their proficiency, this report also provides information about the uncertainty of each statistic.

Two components of uncertainty are accounted for in the variability of statistics based on proficiency: the uncertainty due to sampling only a relatively small number of students and the uncertainty due to sampling only a relatively small number of questions. The variability of estimates of percentages of students having certain background characteristics or answering a certain cognitive question correctly is accounted for by the first component alone. Because NAEP uses complex sampling procedures, conventional formulas for estimating sampling variability that



assume simple random sampling are inappropriate and NAEP uses a jackknife replication procedure to estimate standard errors. The jackknife standard error provides a reasonable measure of uncertainty for any information about students that can be observed without error, but each student typically responds to so few items within any content area that the proficiency measurement for any single student would be imprecise. In this case, using plausible values technology makes it possible to describe the performance of groups and subgroups of students, but the underlying imprecision that makes this step necessary adds an additional component of variability to statistics based on NAEP proficiencies.[86]

DRAWING INFERENCES FROM THE RESULTS

The use of confidence intervals, based on the standard errors, provides a way to make inferences about the population means and proportions in a manner that reflects the uncertainty associated with the sample estimates. An estimated sample mean proficiency ± 2 standard errors represents a 95 percent confidence interval for the corresponding population quantity. This means that with approximately 95 percent certainty, the average performance of the entire population of interest is within ± 2 standard errors of the sample mean.

As an example, suppose that the average mathematics proficiency of students in a particular group was 256, with a standard error of 1.2. A 95 percent confidence interval for the population quantity would be as follows:

Mean ± 2 standard errors = 256 ± 2 (1.2) = 256 ± 2.4 =
256 – 2.4 and 256 + 2.4 = 253.6, 258.4

Thus, one can conclude with 95 percent certainty that the average proficiency for the entire population of students in that group is between 253.6 and 258.4.

Similar confidence intervals can be constructed for percentages, provided that the percentages are not extremely large (greater than 90) or extremely small (less than 10). For extreme percentages, confidence intervals constructed in the above manner may not be appropriate, and procedures for obtaining accurate confidence intervals are quite complicated.

To determine whether there is a real difference between the mean proficiency (or proportion of a certain attribute) for two groups in the population, one needs to obtain an estimate of the degree of uncertainty associated with the difference between the proficiency means or proportions of these groups for the sample. This estimate of the degree of uncertainty — called the standard error of the difference between the groups — is obtained by taking the square of each group's standard error, summing these squared standard errors, and then taking the square root of this sum.

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[86] For further details, see Eugene G. Johnson, "Considerations and Techniques for the Analysis of NAEP Data," in *Journal of Educational Statistics* (December 1989).

Similar to the manner in which the standard error for an individual group mean or proportion is used, the standard error of the difference can be used to help determine whether differences between assessment years are real. If one wants to hold the certainty level for a specific set of comparisons at a particular level (e.g., .95), adjustments (called multiple-comparisons procedures) need to be made. One such procedure — the Bonferroni method — was used to form confidence intervals for the trend differences between 1990 and each previous assessment year, as well as between the first and each successive year.

Multiple-comparisons procedures are useful for controlling the overall Type I error rate for a defined set of hypothesis tests. However, especially when the number of potential comparisons which could be made is large, as in NAEP data, this protection comes at the substantial loss of power in detecting specific consistent patterns in the data. For example, more powerful and complex tests of significance designed to identify consistent patterns in the data might judge that two groups were significantly different when a Bonferroni multiple-comparisons procedure would not.

One such test of patterns in NAEP data is the test for linear and quadratic trends applied to the national trend data in reading, mathematics, and science. The linear and quadratic components of the trend in average proficiency for a given subject area and age group were estimated by applying two sets of orthogonal contrasts to the set of average proficiencies by year. The linear component of the trend was estimated by the sum $b_1 = \Sigma c_i x_i$, where the x_i are the proficiency means by year and the c_i are defined such that b_1 corresponds to the slope of an unweighted regression of the proficiency means on the assessment year. The quadratic component was estimated by the sum $b_2 = \Sigma d_i x_i$, where the d_i are orthogonal to the c_i and are defined such that b_2 is the quadratic term in the unweighted regression of the proficiency means on the assessment year and the square of the assessment year. The statistical significance of b_1 and b_2 was evaluated by comparing each estimate to its standard error. The standard error of b_1 was computed as the square root of the sum $\Sigma c_i^2 SE_i^2$, where SE_i is the standard error of x_i. The standard error of the b_2 was analogously defined. The results of the linear and quadratic tests conducted for the national trend data in science, mathematics, and reading are shown in TABLE A.13.

TABLE A.13

Results for Trend Tests

	AGE 9	AGE 13	AGE 17
Science			
Linear Term	.24 (.06)*	.06 (.06)	– .69 (.06)*
Quadratic Term	.07 (.01)*	.07 (.01)*	.10 (.01)*
Mathematics			
Linear Term	.58 (.06)*	.30 (.08)*	.08 (.08)
Quadratic Term	.08 (.01)*	.01 (.02)	.07 (.01)*
Reading			
Linear Term	.08 (.06)	.11 (.05)*	.29 (.06)*
Quadratic Term	– .05 (.01)*	– .02 (.01)*	.01 (.01)

* Indicates a statistically significant term at the .05 level. Standard errors of the terms are shown in parentheses.

DATA APPENDIX

SCIENCE

NAEP 1990 SCIENCE TREND ASSESSMENT—AGE 9

Average Science Proficiency Across Assessment Years

	1976-77	1981-82	1985-86	1989-90	DIFFERENCE 1977-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	219.9(1.2)	220.8(1.8)	224.3(1.2)	228.7(0.8)	8.8(1.4)	7.8(1.9)	4.4(1.5)
SEX							
MALE	222.1(1.3)	221.0(2.3)	227.3(1.4)	230.3(1.1)	8.2(1.7)	9.3(2.5)	3.0(1.8)
FEMALE	217.6(1.2)	220.7(2.0)	221.3(1.4)	227.1(1.0)	9.5(1.6)	6.4(2.2)	5.7(1.8)
RACE/ETHNICITY							
WHITE	229.6(0.9)	229.0(1.9)	231.9(1.2)	237.5(0.8)	7.9(1.2)	8.4(2.1)	5.6(1.4)
BLACK	174.8(1.8)	187.0(3.0)	196.2(1.9)	196.4(2.0)	21.6(2.6)	9.4(3.6)	0.2(2.7)
HISPANIC	191.9(2.7)	189.0(4.2)	199.4(3.1)	206.2(2.2)	14.4(3.5)	17.3(4.7)	6.8(3.8)
OTHER	214.4(5.4)	222.8(5.3)	220.6(4.6)	227.4(3.6)	13.0(6.5)	4.6(6.4)	6.7(5.8)
REGION							
NORTHEAST	224.4(1.6)	221.8(2.9)	228.2(3.5)	231.1(2.4)	6.6(2.9)	9.3(3.7)	2.9(4.3)
SOUTHEAST	205.1(2.9)	213.9(3.6)	218.8(3.1)	219.9(1.9)	14.8(3.5)	6.0(4.0)	1.1(3.7)
CENTRAL	225.2(2.2)	226.3(3.5)	227.9(2.2)	234.2(1.7)	8.9(2.8)	7.9(3.9)	6.3(2.8)
WEST	220.9(2.2)	219.9(4.1)	222.1(3.2)	229.5(1.8)	8.6(2.9)	9.6(4.5)	7.3(3.7)
TYPE OF COMMUNITY							
EXTREME RURAL	224.5(3.2)	212.4(5.3)	224.0(4.4)	233.0(4.3)	8.5(5.4)	20.6(6.8)	9.0(6.2)
DISADVANTAGED URBAN	180.5(3.4)	192.2(5.7)	191.6(3.8)	208.5(5.9)	28.0(6.8)	16.3(8.2)	16.9(7.0)
ADVANTAGED URBAN	242.0(2.2)	243.2(4.3)	243.1(2.4)	241.2(1.6)	-0.8(2.7)	-2.0(4.5)	-1.9(2.8)
OTHER	220.2(1.4)	221.5(2.1)	222.7(1.7)	228.6(1.2)	8.4(1.8)	7.2(2.4)	6.0(2.1)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	198.5(2.2)	198.2(6.0)	203.6(2.9)	209.8(2.7)	11.3(3.5)	11.6(6.6)	6.2(4.0)
GRADUATED H.S.	223.0(1.4)	218.0(3.3)	219.6(1.5)	225.8(1.7)	2.8(2.2)	7.7(3.7)	6.2(2.3)
SOME EDUC AFTER H.S.	237.2(1.5)	229.1(3.2)	235.8(2.6)	237.6(2.1)	0.4(2.6)	8.4(3.8)	1.8(3.4)
GRADUATED COLLEGE	232.3(1.4)	230.5(2.3)	235.2(1.4)	236.2(1.3)	3.9(1.9)	5.7(2.6)	1.1(1.9)
UNKNOWN	211.0(1.4)	210.8(2.8)	215.3(1.5)	221.5(1.2)	10.5(1.8)	10.7(3.0)	6.2(1.9)
TYPE OF SCHOOL							
PUBLIC	218.0(1.4)	219.7(2.0)	222.6(1.4)	227.7(0.9)	9.7(1.7)	8.0(2.2)	5.1(1.7)
PRIVATE	234.6(2.2)	231.5(3.2)	233.0(2.9)	236.8(2.4)	2.2(3.3)	5.3(4.0)	3.7(3.8)
QUARTILES							
UPPER	265.6(0.9)	268.3(1.8)	268.8(1.2)	271.0(0.8)	5.4(1.2)	2.7(2.0)	2.2(1.5)
MIDDLE TWO	222.1(0.5)	221.7(1.1)	225.8(0.6)	231.0(0.5)	8.9(0.7)	9.3(1.2)	5.2(0.8)
LOWER	169.6(1.1)	171.4(2.0)	176.7(1.0)	181.9(0.9)	12.3(1.5)	10.5(2.2)	5.2(1.4)

NOTE: Some science trend data for 1969-70 and 1973 extrapolated from previous analyses can be found in Chapter One.

NAEP 1990 SCIENCE TREND ASSESSMENT—AGE 13

Average Science Proficiency Across Assessment Years

	1976-77	1981-82	1985-86	1989-90	DIFFERENCE 1977-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	247.4(1.1)	250.1(1.3)	251.4(1.4)	255.2(0.9)	7.8(1.5)	5.0(1.6)	3.7(1.7)
SEX							
MALE	251.1(1.3)	255.6(1.5)	256.1(1.6)	258.5(1.1)	7.5(1.7)	2.9(1.9)	2.5(1.9)
FEMALE	243.7(1.2)	245.0(1.3)	246.9(1.5)	251.8(1.1)	8.1(1.6)	6.8(1.7)	4.9(1.9)
RACE/ETHNICITY							
WHITE	256.1(0.8)	257.3(1.1)	259.2(1.4)	264.1(0.9)	8.0(1.2)	6.8(1.4)	4.9(1.7)
BLACK	208.1(2.4)	217.1(1.3)	221.6(2.5)	225.7(3.1)	17.7(3.9)	8.6(3.3)	4.1(3.9)
HISPANIC	213.4(1.9)	225.5(3.9)	226.1(3.1)	231.6(2.6)	18.3(3.2)	6.2(4.6)	5.6(4.0)
OTHER	235.0(3.3)	262.4(5.9)	253.0(4.0)	248.2(10.9)	13.2(11.4)	-14.2(12.3)	-4.8(11.6)
REGION							
NORTHEAST	255.2(2.3)	254.1(2.1)	257.6(3.1)	256.8(2.7)	1.6(3.6)	2.7(3.4)	-0.8(4.2)
SOUTHEAST	235.1(1.8)	238.7(2.3)	247.1(2.2)	251.3(1.9)	16.2(2.6)	12.7(3.0)	4.3(2.9)
CENTRAL	253.8(1.8)	253.8(2.6)	249.4(5.3)	260.4(2.8)	6.6(3.4)	6.6(3.9)	11.1(6.0)
WEST	243.0(2.3)	252.4(2.8)	252.3(2.7)	252.6(2.1)	9.6(3.1)	0.2(3.5)	0.3(3.4)
TYPE OF COMMUNITY							
EXTREME RURAL	244.8(3.2)	244.9(3.7)	257.5(3.0)	249.3(4.0)	4.5(5.1)	4.4(5.4)	-8.1(5.0)
DISADVANTAGED URBAN	215.7(2.8)	222.3(3.5)	222.7(3.9)	226.6(4.6)	10.8(5.3)	4.2(5.8)	3.8(6.0)
ADVANTAGED URBAN	267.9(1.3)	276.3(2.1)	267.2(3.8)	268.3(1.8)	0.4(2.2)	-8.1(2.7)	1.0(4.2)
OTHER	247.0(1.1)	250.8(1.0)	251.9(1.2)	258.7(1.3)	11.7(1.7)	7.9(1.6)	6.7(1.8)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	223.5(1.3)	225.3(1.9)	229.4(2.7)	232.9(2.1)	9.5(2.5)	7.6(2.8)	3.5(3.4)
GRADUATED H.S.	245.3(1.1)	243.1(1.3)	244.8(1.4)	247.3(1.3)	2.0(1.7)	4.2(1.8)	2.5(1.9)
SOME EDUC AFTER H.S.	260.3(1.3)	258.8(1.5)	257.8(1.4)	262.8(1.2)	2.5(1.7)	4.0(1.9)	5.0(1.8)
GRADUATED COLLEGE	266.4(1.0)	263.5(1.5)	264.4(1.9)	267.5(1.1)	1.0(1.5)	4.0(1.9)	3.1(2.2)
UNKNOWN	221.9(1.8)	229.1(2.8)	226.5(2.7)	224.3(2.1)	2.4(2.7)	-4.8(3.5)	-2.2(3.4)
TYPE OF SCHOOL							
PUBLIC	245.2(1.2)	248.5(1.4)	250.9(1.4)	253.6(1.1)	8.3(1.6)	5.0(1.8)	2.6(1.8)
PRIVATE	267.7(2.1)	263.7(3.2)	263.1(6.4)	69.0(1.8)	1.3(2.8)	5.3(3.7)	5.9(6.7)
QUARTILES							
UPPER	290.5(0.5)	290.5(0.9)	292.1(1.1)	297.1(0.7)	6.6(0.9)	6.6(1.2)	5.0(1.3)
MIDDLE TWO	249.0(0.6)	251.1(0.6)	252.3(0.7)	256.2(0.6)	7.1(0.9)	5.1(0.9)	3.8(1.0)
LOWER	201.1(0.8)	208.1(0.8)	209.2(0.9)	211.2(1.2)	10.2(1.4)	3.1(1.4)	2.0(1.5)

NOTE: Some science trend data for 1969-70 and 1973 extrapolated from previous analyses can be found in Chapter One.

NAEP 1990 SCIENCE TREND ASSESSMENT—AGE 17

Average Science Proficiency Across Assessment Years

	1976-77	1981-82	1985-86	1989-90	DIFFERENCE 1977-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	289.5(1.0)	283.3(1.2)	288.5(1.4)	290.4(1.1)	0.8(1.5)	7.1(1.6)	1.9(1.8)
SEX							
MALE	297.0(1.2)	291.9(1.4)	294.9(1.9)	295.6(1.3)	-1.4(1.8)	3.7(1.9)	0.7(2.3)
FEMALE	282.2(1.1)	275.2(1.3)	282.3(1.5)	285.4(1.6)	3.2(2.0)	10.2(2.1)	3.1(2.2)
RACE/ETHNICITY							
WHITE	297.7(0.7)	293.1(1.0)	297.5(1.7)	300.9(1.1)	3.3(1.3)	7.8(1.5)	3.4(2.0)
BLACK	240.2(1.5)	234.7(1.7)	252.8(2.9)	253.0(4.5)	12.8(4.8)	18.3(4.8)	0.2(5.4)
HISPANIC	262.3(2.2)	248.7(2.3)	259.3(3.8)	261.5(4.4)	-0.8(4.9)	12.8(5.0)	2.2(5.8)
OTHER	284.4(4.0)	269.1(5.2)	276.8(11.2)	292.0(5.6)	7.6(6.9)	22.9(7.6)	15.2(12.5)
REGION							
NORTHEAST	296.3(2.2)	284.4(2.0)	292.2(4.3)	292.6(3.2)	-3.7(3.9)	8.2(3.8)	0.5(5.4)
SOUTHEAST	276.4(1.9)	276.3(2.7)	283.5(2.0)	283.6(2.4)	7.2(3.1)	7.3(3.6)	0.1(3.1)
CENTRAL	294.0(1.5)	289.3(2.6)	294.4(2.3)	299.6(3.0)	5.6(3.4)	10.4(4.0)	5.2(3.8)
WEST	286.5(1.5)	280.9(2.7)	283.2(3.8)	285.8(2.3)	-0.7(2.7)	4.9(3.5)	2.7(4.4)
TYPE OF COMMUNITY							
EXTREME RURAL	289.0(2.6)	283.3(3.3)	296.2(6.7)	293.9(3.5)	4.9(4.4)	10.7(4.9)	-2.3(7.6)
DISADVANTAGED URBAN	256.3(3.1)	249.6(5.5)	241.1(4.0)	254.0(7.2)	-2.4(7.9)	4.4(9.0)	12.9(8.3)
ADVANTAGED URBAN	304.2(3.2)	304.5(2.1)	302.0(7.1)	304.9(4.3)	0.8(5.4)	0.5(4.8)	2.9(8.3)
OTHER	290.8(1.0)	284.4(1.5)	289.8(1.6)	292.5(1.4)	1.7(1.7)	8.1(2.0)	2.7(2.1)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	265.3(1.3)	258.5(2.4)	257.5(3.1)	261.4(2.8)	-4.0(3.1)	2.8(3.7)	3.8(4.2)
GRADUATED H.S.	284.4(0.8)	275.2(1.5)	277.0(2.0)	276.3(1.4)	-8.0(1.6)	1.1(2.1)	-0.6(2.5)
SOME EDUC AFTER H.S.	295.6(1.1)	290.1(1.7)	295.1(2.5)	296.5(1.6)	0.8(1.9)	6.4(2.3)	1.3(3.0)
GRADUATED COLLEGE	309.3(1.0)	300.2(1.7)	303.8(2.1)	305.5(1.7)	-3.8(2.0)	5.4(2.4)	1.7(2.7)
UNKNOWN	252.6(3.2)	251.6(3.9)	245.4(5.5)	248.2(5.5)	-4.4(6.4)	-3.4(6.8)	2.8(7.8)
TYPE OF SCHOOL							
PUBLIC	288.2(1.0)	282.3(1.1)	287.1(1.6)	289.0(1.1)	0.8(1.5)	6.7(1.6)	1.9(2.0)
PRIVATE	308.4(2.4)	292.0(2.9)	321.3(10.1)	307.8(6.6)	-0.6(7.1)	15.8(7.2)	-13.4(12.1)
QUARTILES							
UPPER	333.6(0.9)	328.9(1.0)	339.9(1.1)	344.3(0.7)	10.7(1.1)	15.4(1.2)	4.4(1.3)
MIDDLE TWO	291.2(0.5)	286.1(0.7)	289.6(0.7)	291.6(0.7)	0.3(0.9)	5.5(1.0)	1.9(1.0)
LOWER	242.0(0.8)	232.1(1.3)	234.7(1.3)	234.0(1.2)	-8.0(1.4)	1.9(1.7)	-0.7(1.8)

NOTE: Some science trend data for 1969-70 and 1973 extrapolated from previous analyses can be found in Chapter One.

NAEP 1990 SCIENCE TREND ASSESSMENT—AGE 9

Percentage of Students with Science Proficiency At or Above Anchor Level 150

	1976-77	1981-82	1985-86	1989-90	DIFFERENCE 1977-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	93.5(0.6)	95.2(0.7)	96.2(0.3)	97.0(0.3)	3.4(0.7)	1.7(0.8)	0.8(0.5)
SEX							
MALE	94.3(0.5)	95.0(1.0)	96.8(0.5)	96.8(0.5)	2.5(0.7)	1.8(1.1)	0.0(0.7)
FEMALE	92.8(0.7)	95.5(1.2)	95.6(0.6)	97.1(0.4)	4.4(0.8)	1.6(1.2)	1.5(0.7)
RACE/ETHNICITY							
WHITE	97.7(0.3)	98.3(0.4)	98.2(0.3)	99.2(0.2)	1.5(0.4)	0.9(0.5)	1.0(0.4)
BLACK	72.4(1.8)	82.1(3.0)	88.6(1.4)	88.0(1.3)	15.6(2.2)	5.8(3.3)	-0.6(2.0)
HISPANIC	84.6(1.8)	85.1(3.1)	89.6(2.4)	93.6(1.5)	9.0(2.4)	8.6(3.5)	4.0(2.8)
OTHER	94.9(2.4)	95.7(3.2)	95.9(1.8)	96.3(2.6)	1.4(3.6)	0.6(4.1)	0.4(3.2)
REGION							
NORTHEAST	94.6(0.7)	94.5(1.4)	96.7(0.9)	97.1(0.6)	2.5(0.9)	2.6(1.5)	0.4(1.0)
SOUTHEAST	87.8(1.8)	92.7(1.6)	95.0(1.2)	94.6(0.9)	6.8(2.0)	1.9(1.8)	-0.4(1.5)
CENTRAL	95.5(0.8)	97.5(1.1)	97.1(0.6)	98.4(0.7)	2.9(1.0)	0.9(1.3)	1.3(0.9)
WEST	94.9(1.1)	95.4(1.3)	95.9(0.7)	97.7(0.7)	2.8(1.3)	2.3(1.5)	1.8(1.0)
TYPE OF COMMUNITY							
EXTREME RURAL	96.6(0.9)	94.3(2.6)	97.0(1.8)	97.6(1.8)	1.0(2.0)	3.3(3.1)	0.6(2.5)
DISADVANTAGED URBAN	74.9(2.4)	85.2(4.3)	86.3(2.0)	92.2(2.3)	17.3(3.3)	7.0(4.9)	6.0(3.1)
ADVANTAGED URBAN	98.9(0.4)	99.7(0.4)	99.3(0.4)	99.6(0.3)	0.7(0.5)	-0.2(0.5)	0.3(0.5)
OTHER	94.3(0.6)	95.6(0.7)	96.3(0.5)	97.0(0.4)	2.7(0.7)	1.4(0.8)	0.8(0.6)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	86.0(1.7)	85.5(3.5)	90.1(3.4)	93.3(2.3)	7.2(2.8)	7.8(4.2)	3.2(4.1)
GRADUATED H.S.	95.0(0.5)	96.1(1.0)	95.6(0.6)	96.9(0.8)	1.9(1.0)	0.7(1.3)	1.3(1.0)
SOME EDUC AFTER H.S.	97.1(0.9)	96.6(1.8)	98.0(1.1)	97.6(1.2)	0.5(1.5)	1.0(2.1)	-0.3(1.6)
GRADUATED COLLEGE	96.8(0.6)	97.2(0.7)	98.0(0.4)	98.1(0.4)	1.3(0.7)	0.9(0.8)	0.0(0.5)
UNKNOWN	91.4(0.8)	93.8(1.9)	95.0(0.6)	96.0(0.6)	4.6(1.0)	2.2(2.0)	1.0(0.9)
TYPE OF SCHOOL							
PUBLIC	93.0(0.7)	94.9(0.8)	95.8(0.4)	96.7(0.4)	3.6(0.8)	1.9(0.9)	0.9(0.5)
PRIVATE	98.1(0.6)	98.9(1.4)	98.2(0.7)	98.7(0.9)	0.5(1.1)	-0.2(1.6)	0.5(1.1)
QUARTILES							
UPPER	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
MIDDLE TWO	99.5(0.1)	100.0(0.1)	99.8(0.1)	100.0(0.0)	0.5(0.2)	0.0(0.1)	0.1(0.1)
LOWER	75.2(1.4)	81.0(2.5)	85.2(1.1)	87.9(1.2)	12.6(1.8)	6.9(2.7)	2.7(1.6)

NAEP 1990 SCIENCE TREND ASSESSMENT—AGE 9

Percentage of Students with Science Proficiency At or Above Anchor Level 200

	1976-77	1981-82	1985-86	1989-90	DIFFERENCE 1977-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	68.0(1.1)	70.7(1.9)	72.0(1.1)	76.4(0.9)	8.4(1.4)	5.6(2.1)	4.3(1.4)
SEX							
MALE	69.5(1.2)	69.7(2.0)	74.1(1.4)	76.3(1.2)	6.8(1.7)	6.6(2.4)	2.2(1.8)
FEMALE	66.5(1.1)	71.8(2.2)	70.0(1.3)	76.4(1.1)	9.9(1.6)	4.6(2.4)	6.5(1.7)
RACE/ETHNICITY							
WHITE	76.8(0.7)	78.4(2.0)	78.9(1.0)	84.4(0.7)	7.6(1.0)	6.0(2.1)	5.4(1.2)
BLACK	27.2(1.5)	38.9(2.7)	46.2(2.3)	46.4(3.1)	19.2(3.5)	7.5(4.1)	0.2(3.9)
HISPANIC	42.0(3.1)	40.2(6.1)	50.1(3.7)	56.3(3.7)	14.3(4.8)	16.1(7.1)	6.3(5.2)
OTHER	62.0(6.9)	77.0(5.6)	67.4(4.1)	76.3(7.0)	14.3(9.8)	-0.7(8.9)	8.9(8.1)
REGION							
NORTHEAST	72.6(1.6)	71.5(3.5)	75.6(2.5)	78.2(2.3)	5.7(2.8)	6.8(4.2)	2.7(3.4)
SOUTHEAST	55.0(2.4)	63.0(3.6)	67.3(3.0)	68.4(2.4)	13.4(3.4)	5.4(4.3)	1.2(3.8)
CENTRAL	72.5(2.1)	75.4(3.7)	75.2(2.1)	81.9(1.3)	9.4(2.5)	6.5(3.9)	6.7(2.5)
WEST	68.5(2.3)	71.4(3.8)	69.9(3.0)	76.8(2.1)	8.3(3.1)	5.4(4.3)	6.9(3.6)
TYPE OF COMMUNITY							
EXTREME RURAL	72.6(3.1)	66.0(5.1)	73.4(3.8)	81.6(3.6)	9.0(4.8)	15.6(6.3)	8.3(5.3)
DISADVANTAGED URBAN	33.5(3.2)	42.5(7.4)	41.0(5.8)	56.5(6.7)	22.9(7.4)	14.0(10.0)	15.5(8.9)
ADVANTAGED URBAN	85.5(1.7)	88.3(4.0)	86.9(1.8)	87.6(1.7)	2.1(2.4)	-0.7(4.3)	0.7(2.4)
OTHER	68.5(1.3)	71.4(2.3)	71.0(1.4)	76.4(1.1)	7.9(1.7)	4.9(2.5)	5.4(1.8)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	49.8(2.4)	54.9(8.7)	55.1(3.6)	60.5(4.2)	10.7(4.8)	5.6(9.6)	5.4(5.5)
GRADUATED H.S.	71.2(1.4)	68.2(4.3)	69.1(1.9)	75.2(2.1)	4.0(2.5)	7.0(4.8)	6.1(2.8)
SOME EDUC AFTER H.S.	81.9(1.5)	80.7(2.4)	80.2(1.9)	81.3(2.3)	-0.6(2.8)	0.6(3.3)	1.1(3.0)
GRADUATED COLLEGE	77.7(1.2)	78.8(2.0)	80.4(1.2)	81.9(1.2)	4.2(1.7)	3.1(2.3)	1.5(1.7)
UNKNOWN	60.8(1.5)	60.9(3.6)	65.0(2.0)	71.3(1.4)	10.6(2.1)	10.4(3.8)	6.3(2.4)
TYPE OF SCHOOL							
PUBLIC	66.4(1.3)	69.5(2.1)	70.5(1.3)	75.5(1.0)	9.0(1.6)	6.0(2.3)	4.9(1.7)
PRIVATE	80.3(1.7)	82.6(3.5)	79.7(2.3)	83.6(2.4)	3.3(2.9)	1.0(4.2)	3.9(3.3)
QUARTILES							
UPPER	99.0(0.3)	100.0(0.3)	99.7(0.2)	99.9(0.1)	0.9(0.3)	-0.1(0.3)	0.2(0.2)
MIDDLE TWO	78.4(0.6)	85.6(1.9)	84.9(1.1)	90.0(0.8)	11.6(1.0)	4.4(2.0)	5.0(1.4)
LOWER	16.2(1.1)	11.6(2.0)	18.6(1.6)	25.6(2.0)	9.4(2.3)	14.0(2.8)	7.0(2.6)

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Percentage of Students with Science Proficiency At or Above Anchor Level 250

	1976-77	1981-82	1985-86	1989-90	DIFFERENCE 1977-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	25.7(0.7)	24.3(1.8)	27.5(1.4)	31.1(0.8)	5.4(1.1)	6.8(2.0)	3.6(1.6)
SEX							
MALE	27.4(0.9)	25.6(2.6)	29.9(2.0)	33.1(1.1)	5.7(1.4)	7.5(2.8)	3.2(2.2)
FEMALE	24.0(0.9)	23.0(2.0)	25.1(1.4)	29.1(1.0)	5.1(1.4)	6.1(2.3)	4.0(1.7)
RACE/ETHNICITY							
WHITE	30.8(0.7)	29.4(2.1)	32.7(1.5)	37.5(1.1)	6.8(1.3)	8.2(2.4)	4.9(1.8)
BLACK	3.5(0.6)	3.9(1.3)	8.3(1.5)	8.5(1.1)	5.0(1.2)	4.6(1.7)	0.2(1.9)
HISPANIC	8.8(1.7)	4.2(2.7)	10.7(2.4)	11.6(2.1)	2.8(2.7)	7.4(3.4)	0.8(3.2)
OTHER	20.5(4.9)	23.4(11.1)	27.1(5.8)	30.1(6.0)	9.6(7.7)	6.7(12.6)	3.0(8.3)
REGION							
NORTHEAST	28.9(1.1)	25.8(3.1)	30.5(2.9)	33.4(2.9)	4.6(3.1)	7.7(4.2)	2.9(4.1)
SOUTHEAST	17.2(1.5)	20.2(3.6)	23.3(3.0)	24.9(1.4)	7.7(2.1)	4.6(3.8)	1.5(3.3)
CENTRAL	29.2(1.6)	27.5(3.6)	30.1(2.3)	34.4(1.8)	5.2(2.4)	6.8(4.0)	4.3(2.9)
WEST	25.3(1.2)	23.1(4.6)	26.2(2.6)	31.7(1.7)	6.4(2.1)	8.6(4.9)	5.5(3.1)
TYPE OF COMMUNITY							
EXTREME RURAL	26.4(2.8)	18.3(5.6)	25.9(5.8)	33.8(4.3)	7.4(5.2)	15.5(7.0)	8.0(7.3)
DISADVANTAGED URBAN	6.1(1.2)	7.9(4.7)	7.3(2.2)	16.9(3.7)	10.8(3.9)	9.0(5.9)	9.6(4.3)
ADVANTAGED URBAN	42.7(2.6)	42.8(5.0)	43.3(3.3)	40.5(3.0)	-2.3(4.0)	-2.3(5.8)	-2.8(4.5)
OTHER	25.2(0.9)	24.0(2.5)	25.7(1.6)	31.0(1.2)	5.8(1.5)	7.0(2.8)	5.3(2.0)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	12.7(1.3)	8.6(4.0)	12.7(2.7)	16.3(3.5)	3.5(3.7)	7.7(5.3)	3.5(4.4)
GRADUATED H.S.	27.0(1.2)	20.3(3.1)	23.1(1.8)	27.3(1.8)	0.4(2.1)	7.0(3.5)	4.2(2.5)
SOME EDUC AFTER H.S.	39.4(1.5)	31.9(5.1)	38.5(3.7)	40.7(2.5)	1.3(3.0)	8.9(5.7)	2.2(4.5)
GRADUATED COLLEGE	35.1(1.2)	32.2(2.7)	36.8(1.8)	38.3(1.2)	3.2(1.7)	6.1(2.9)	1.6(2.2)
UNKNOWN	18.9(0.8)	16.1(2.1)	19.5(1.7)	23.9(1.3)	5.0(1.5)	7.8(2.5)	4.4(2.1)
TYPE OF SCHOOL							
PUBLIC	24.5(0.9)	23.9(2.1)	26.3(1.5)	30.3(0.8)	5.9(1.2)	6.4(2.2)	4.0(1.7)
PRIVATE	35.6(1.9)	28.2(5.6)	33.8(2.8)	37.2(3.0)	1.6(3.6)	9.0(6.4)	3.3(4.1)
QUARTILES							
UPPER	70.1(1.1)	79.1(3.0)	76.1(2.0)	80.2(1.5)	10.2(1.8)	1.1(3.3)	4.1(2.5)
MIDDLE TWO	16.2(0.6)	9.1(1.9)	16.9(1.5)	22.1(1.0)	5.9(1.1)	13.1(2.1)	5.2(1.8)
LOWER	0.2(0.1)	0.0(0.1)	0.2(0.2)	0.2(0.1)	0.0(0.2)	0.2(0.2)	0.0(0.2)

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Percentage of Students with Science Proficiency At or Above Anchor Level 300

	1976-77	1981-82	1985-86	1989-90	DIFFERENCE 1977-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	3.2(0.3)	2.3(0.7)	3.0(0.5)	3.1(0.3)	-0.1(0.4)	0.8(0.7)	0.1(0.6)
SEX							
MALE	3.7(0.3)	2.5(1.0)	3.8(0.6)	4.2(0.6)	0.5(0.6)	1.7(1.2)	0.4(0.8)
FEMALE	2.6(0.3)	2.1(0.6)	2.2(0.5)	2.0(0.3)	-0.6(0.4)	-0.1(0.7)	-0.2(0.6)
RACE/ETHNICITY							
WHITE	3.9(0.3)	2.9(0.9)	3.8(0.6)	3.9(0.4)	0.0(0.5)	1.0(0.9)	0.1(0.7)
BLACK	0.2(0.1)	0.1(0.4)	0.3(0.2)	0.1(0.2)	0.0(0.2)	0.1(0.5)	-0.1(0.3)
HISPANIC	0.3(0.4)	0.0(0.4)	0.2(0.2)	0.4(0.4)	0.0(0.6)	0.4(0.6)	0.2(0.5)
OTHER	1.9(1.0)	0.0(1.0)	2.1(1.1)	3.2(1.5)	1.3(1.9)	3.2(1.9)	1.1(1.9)
REGION							
NORTHEAST	3.6(0.4)	2.6(1.2)	3.7(1.9)	3.4(0.7)	-0.2(0.8)	0.9(1.4)	-0.3(2.1)
SOUTHEAST	1.6(0.3)	1.4(0.5)	2.3(0.4)	2.2(0.7)	0.5(0.7)	0.7(0.9)	-0.2(0.8)
CENTRAL	3.8(0.5)	2.9(1.5)	3.2(0.8)	3.8(0.8)	-0.1(1.0)	0.9(1.7)	0.6(1.1)
WEST	3.2(0.5)	2.1(1.5)	2.7(0.9)	3.0(0.5)	-0.2(0.7)	0.9(1.6)	0.2(1.0)
TYPE OF COMMUNITY							
EXTREME RURAL	2.9(0.8)	0.4(0.8)	2.0(0.9)	3.3(1.2)	0.4(1.4)	2.9(1.4)	1.3(1.5)
DISADVANTAGED URBAN	0.4(0.3)	0.4(0.6)	0.2(0.6)	1.5(1.0)	1.1(1.1)	1.1(1.2)	1.3(1.2)
ADVANTAGED URBAN	7.3(1.3)	5.5(2.2)	6.7(1.0)	4.4(0.9)	-2.9(1.6)	-1.1(2.4)	-2.2(1.4)
OTHER	2.9(0.3)	2.3(0.8)	2.4(0.6)	3.0(0.3)	0.1(0.5)	0.7(0.9)	0.6(0.7)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	0.9(0.4)	0.2(0.4)	0.8(0.9)	0.5(0.5)	-0.5(0.6)	0.2(0.6)	-0.3(1.0)
GRADUATED H.S.	3.2(0.3)	1.8(1.4)	1.6(0.5)	2.0(0.6)	-1.2(0.7)	0.2(1.5)	0.4(0.8)
SOME EDUC AFTER H.S.	5.7(1.0)	2.4(1.8)	4.4(1.4)	5.4(1.3)	-0.3(1.6)	3.0(2.2)	1.0(1.9)
GRADUATED COLLEGE	5.4(0.7)	3.7(1.1)	5.0(1.0)	4.5(0.6)	-0.8(0.9)	0.8(1.3)	-0.5(1.2)
UNKNOWN	1.7(0.4)	0.8(0.5)	1.4(0.4)	1.6(0.5)	0.0(0.6)	0.8(0.7)	0.2(0.7)
TYPE OF SCHOOL							
PUBLIC	2.9(0.3)	2.3(0.7)	2.8(0.6)	3.0(0.4)	0.1(0.5)	0.7(0.8)	0.2(0.7)
PRIVATE	5.1(1.1)	2.1(1.2)	4.0(0.7)	3.9(1.0)	-1.3(1.4)	1.8(1.6)	-0.2(1.2)
QUARTILES							
UPPER	12.0(0.9)	9.1(2.3)	11.7(1.7)	12.1(1.3)	0.0(1.5)	2.9(2.6)	0.4(2.1)
MIDDLE TWO	0.3(0.1)	0.0(0.1)	0.1(0.1)	0.2(0.1)	-0.1(0.2)	0.2(0.2)	0.0(0.2)
LOWER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)

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Percentage of Students with Science Proficiency At or Above Anchor Level 350

	1976-77	1981-82	1985-86	1989-90	DIFFERENCE 1977-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	0.1(0.0)	0.0(0.1)	0.1(0.1)	0.1(0.0)	0.0(0.0)	0.0(0.1)	0.0(0.1)
SEX							
MALE	0.1(0.0)	0.1(0.2)	0.1(0.1)	0.1(0.1)	0.1(0.1)	0.1(0.2)	0.0(0.1)
FEMALE	0.1(0.0)	0.0(0.0)	0.1(0.1)	0.0(0.1)	-0.1(0.1)	0.0(0.1)	-0.1(0.2)
RACE/ETHNICITY							
WHITE	0.1(0.0)	0.1(0.1)	0.1(0.1)	0.1(0.1)	0.0(0.1)	0.0(0.1)	-0.1(0.1)
BLACK	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
HISPANIC	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
OTHER	0.0(0.0)	0.0(0.0)	0.1(0.0)	0.1(0.0)	0.1(0.0)	0.1(0.0)	0.0(0.0)
REGION							
NORTHEAST	0.1(0.1)	0.0(0.1)	0.2(0.3)	0.0(0.3)	0.0(0.3)	0.0(0.3)	-0.1(0.4)
SOUTHEAST	0.0(0.0)	0.0(0.0)	0.1(0.0)	0.1(0.1)	0.1(0.1)	0.1(0.1)	0.0(0.1)
CENTRAL	0.1(0.1)	0.0(0.3)	0.1(0.1)	0.1(0.1)	0.0(0.2)	0.0(0.3)	-0.1(0.2)
WEST	0.0(0.1)	0.1(0.1)	0.1(0.1)	0.1(0.1)	0.0(0.1)	0.0(0.1)	0.0(0.2)
TYPE OF COMMUNITY							
EXTREME RURAL	0.0(0.0)	0.0(0.0)	0.2(0.7)	0.0(0.7)	0.0(0.7)	0.0(0.7)	-0.1(1.0)
DISADVANTAGED URBAN	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
ADVANTAGED URBAN	0.2(0.2)	0.1(0.2)	0.3(0.2)	0.0(0.1)	-0.1(0.2)	-0.1(0.2)	-0.2(0.3)
OTHER	0.1(0.0)	0.0(0.1)	0.1(0.1)	0.1(0.0)	0.0(0.1)	0.0(0.1)	0.0(0.1)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
GRADUATED H.S.	0.1(0.1)	0.0(0.1)	0.0(0.2)	0.0(0.2)	-0.1(0.2)	0.0(0.2)	0.0(0.2)
SOME EDUC AFTER H.S.	0.1(0.1)	0.0(0.1)	0.1(0.1)	0.1(0.1)	0.0(0.2)	0.1(0.2)	0.0(0.2)
GRADUATED COLLEGE	0.1(0.1)	0.1(0.2)	0.2(0.2)	0.1(0.1)	0.0(0.1)	0.0(0.2)	-0.1(0.2)
UNKNOWN	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
TYPE OF SCHOOL							
PUBLIC	0.0(0.0)	0.1(0.1)	0.1(0.1)	0.1(0.0)	0.0(0.0)	0.0(0.1)	0.0(0.1)
PRIVATE	0.2(0.2)	0.0(0.2)	0.2(0.2)	0.1(0.2)	-0.1(0.3)	0.1(0.3)	-0.1(0.3)
QUARTILES							
UPPER	0.2(0.1)	0.2(0.3)	0.4(0.3)	0.2(0.1)	0.0(0.2)	0.1(0.4)	-0.2(0.4)
MIDDLE TWO	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
LOWER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)

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Percentage of Students with Science Proficiency At or Above Anchor Level 150

	1976-77	1981-82	1985-86	1989-90	DIFFERENCE 1977-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	98.5(0.2)	99.5(0.1)	99.7(0.1)	99.7(0.1)	1.2(0.2)	0.2(0.2)	0.0(0.1)
SEX							
MALE	98.8(0.2)	99.7(0.1)	99.8(0.1)	99.7(0.1)	0.9(0.3)	0.0(0.2)	-0.1(0.2)
FEMALE	98.2(0.2)	99.2(0.2)	99.7(0.1)	99.7(0.2)	1.5(0.3)	0.4(0.2)	0.0(0.2)
RACE/ETHNICITY							
WHITE	99.6(0.1)	99.9(0.0)	99.9(0.1)	100.0(0.1)	0.3(0.1)	0.1(0.1)	0.1(0.1)
BLACK	93.1(1.0)	97.5(0.7)	99.0(0.4)	98.8(0.6)	5.7(1.1)	1.3(0.9)	-0.2(0.7)
HISPANIC	94.3(1.3)	98.0(0.8)	99.0(0.6)	98.9(0.6)	4.6(1.5)	0.9(1.0)	-0.2(0.8)
OTHER	98.0(1.1)	99.8(0.4)	100.0(0.4)	99.5(0.6)	1.5(1.2)	-0.4(0.8)	-0.5(0.8)
REGION							
NORTHEAST	99.3(0.2)	99.5(0.2)	99.8(0.1)	99.7(0.3)	0.4(0.3)	0.2(0.3)	-0.1(0.3)
SOUTHEAST	97.3(0.4)	98.9(0.4)	99.5(0.3)	99.6(0.2)	2.3(0.5)	0.7(0.4)	0.1(0.4)
CENTRAL	99.1(0.2)	99.8(0.1)	99.8(0.3)	99.9(0.2)	0.8(0.3)	0.1(0.2)	0.1(0.4)
WEST	98.1(0.3)	99.5(0.2)	99.8(0.1)	99.6(0.2)	1.5(0.4)	0.1(0.3)	-0.2(0.2)
TYPE OF COMMUNITY							
EXTREME RURAL	98.6(0.4)	99.2(0.3)	99.9(0.3)	99.6(0.5)	1.0(0.6)	0.4(0.6)	-0.3(0.6)
DISADVANTAGED URBAN	93.8(1.4)	97.9(0.6)	98.7(0.7)	98.6(0.8)	4.8(1.6)	0.7(1.0)	-0.2(1.1)
ADVANTAGED URBAN	99.8(0.1)	100.0(0.1)	100.0(0.1)	100.0(0.1)	0.2(0.1)	0.0(0.1)	0.0(0.1)
OTHER	98.7(0.1)	99.6(0.2)	99.8(0.1)	99.8(0.1)	1.2(0.2)	0.2(0.2)	0.1(0.1)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	96.4(0.6)	97.9(0.9)	98.6(1.0)	99.5(0.4)	3.1(0.7)	1.7(1.0)	1.0(1.1)
GRADUATED H.S.	99.0(0.2)	99.6(0.3)	99.8(0.1)	99.7(0.2)	0.7(0.3)	0.1(0.4)	-0.2(0.3)
SOME EDUC AFTER H.S.	99.6(0.2)	99.8(0.2)	99.9(0.2)	99.9(0.2)	0.4(0.2)	0.1(0.3)	0.0(0.3)
GRADUATED COLLEGE	99.7(0.1)	99.9(0.1)	99.9(0.1)	99.9(0.2)	0.1(0.2)	0.0(0.2)	0.0(0.2)
UNKNOWN	95.5(0.7)	98.6(0.6)	98.9(0.5)	98.4(0.7)	3.0(1.0)	-0.2(0.9)	-0.5(0.9)
TYPE OF SCHOOL							
PUBLIC	98.4(0.2)	99.4(0.1)	99.7(0.1)	99.7(0.1)	1.3(0.2)	0.2(0.2)	0.0(0.1)
PRIVATE	99.8(0.3)	99.8(0.1)	100.0(0.1)	100.0(0.1)	0.2(0.3)	0.2(0.2)	0.0(0.2)
QUARTILES							
UPPER	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
MIDDLE TWO	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
LOWER	94.1(0.6)	97.9(0.5)	98.8(0.4)	98.8(0.3)	4.7(0.7)	0.8(0.6)	-0.1(0.5)

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Percentage of Students with Science Proficiency At or Above Anchor Level 200

	1976-77	1981-82	1985-86	1989-90	DIFFERENCE 1977-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	86.0(0.7)	89.8(0.8)	91.6(1.0)	92.3(0.7)	6.4(1.0)	2.5(1.0)	0.8(1.2)
SEX							
MALE	87.2(0.8)	91.9(0.8)	92.9(1.0)	92.7(0.8)	5.4(1.1)	0.7(1.1)	-0.2(1.3)
FEMALE	84.7(0.8)	87.9(1.0)	90.3(1.2)	92.0(0.8)	7.3(1.2)	4.1(1.3)	1.7(1.5)
RACE/ETHNICITY							
WHITE	92.2(0.5)	94.4(0.6)	96.1(0.8)	96.9(0.4)	4.7(0.6)	2.5(0.7)	0.7(0.9)
BLACK	57.3(2.4)	68.6(2.4)	73.6(3.0)	77.6(3.6)	20.3(4.3)	9.0(4.3)	4.0(4.7)
HISPANIC	62.2(2.4)	75.5(3.3)	76.7(3.2)	80.2(2.9)	18.1(3.7)	4.8(4.4)	3.6(4.3)
OTHER	80.9(2.9)	94.2(2.4)	93.6(3.8)	88.1(4.9)	7.1(5.7)	-6.1(5.4)	-5.5(6.2)
REGION							
NORTHEAST	90.7(1.4)	91.5(1.1)	93.5(1.2)	92.6(1.8)	1.9(2.3)	1.1(2.1)	-0.9(2.2)
SOUTHEAST	78.1(1.7)	83.6(2.2)	89.8(1.7)	91.0(1.2)	12.9(2.1)	7.5(2.5)	1.3(2.1)
CENTRAL	89.9(1.1)	92.0(1.3)	91.9(3.5)	94.6(1.8)	4.7(2.1)	2.6(2.2)	2.7(3.9)
WEST	83.5(1.5)	91.3(1.4)	91.3(1.6)	91.2(1.3)	7.7(2.0)	-0.1(1.9)	-0.1(2.1)
TYPE OF COMMUNITY							
EXTREME RURAL	86.2(2.4)	87.8(2.4)	95.9(1.0)	91.3(2.2)	5.1(3.2)	3.4(3.3)	-4.6(2.4)
DISADVANTAGED URBAN	64.1(3.0)	72.4(3.4)	73.4(5.8)	75.7(4.6)	11.6(5.5)	3.3(5.8)	2.3(7.4)
ADVANTAGED URBAN	96.2(0.6)	98.8(0.6)	97.5(1.5)	97.2(1.2)	0.9(1.3)	-1.6(1.3)	-0.3(1.9)
OTHER	86.1(0.8)	91.0(0.8)	92.5(0.9)	94.4(0.7)	8.3(1.0)	3.4(1.0)	2.0(1.1)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	71.6(1.6)	75.8(2.4)	79.8(3.5)	82.4(2.9)	10.9(3.3)	6.7(3.8)	2.6(4.5)
GRADUATED H.S.	87.0(0.8)	88.6(1.1)	90.7(1.4)	91.4(1.1)	4.4(1.4)	2.8(1.5)	0.7(1.7)
SOME EDUC AFTER H.S.	93.4(0.9)	94.9(1.4)	95.9(0.7)	96.6(0.8)	3.1(1.2)	1.7(1.6)	0.7(1.1)
GRADUATED COLLEGE	95.0(0.5)	95.5(0.7)	95.8(0.7)	96.4(0.5)	1.4(0.7)	0.9(0.9)	0.6(0.8)
UNKNOWN	70.1(1.9)	77.9(2.1)	78.1(3.1)	75.4(2.9)	5.3(3.4)	-2.6(3.5)	-2.7(4.3)
TYPE OF SCHOOL							
PUBLIC	84.9(0.8)	89.2(0.9)	91.3(1.0)	91.6(0.8)	6.7(1.1)	2.4(1.2)	0.3(1.3)
PRIVATE	95.7(1.0)	95.0(1.5)	97.3(1.8)	98.4(0.8)	2.6(1.3)	3.3(1.7)	1.1(2.0)
QUARTILES							
UPPER	99.9(0.1)	100.0(0.1)	100.0(0.1)	100.0(0.1)	0.1(0.1)	0.0(0.1)	0.0(0.1)
MIDDLE TWO	95.5(0.3)	98.2(0.2)	99.4(0.2)	99.6(0.2)	4.2(0.4)	1.5(0.3)	0.2(0.3)
LOWER	53.0(1.3)	63.0(2.0)	67.5(2.7)	70.1(2.1)	17.0(2.4)	7.0(2.9)	2.6(3.4)

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Percentage of Students with Science Proficiency At or Above Anchor Level 250

	1976-77	1981-82	1985-86	1989-90	DIFFERENCE 1977-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	48.8(1.1)	50.9(1.6)	52.5(1.6)	56.5(1.0)	7.7(1.5)	5.6(1.9)	4.1(1.9)
SEX							
MALE	52.3(1.3)	56.2(1.8)	57.3(2.1)	59.8(1.3)	7.6(1.8)	3.6(2.2)	2.5(2.5)
FEMALE	45.4(1.2)	46.0(1.6)	47.7(1.7)	53.3(1.4)	7.9(1.9)	7.3(2.1)	5.5(2.2)
RACE/ETHNICITY							
WHITE	56.5(0.9)	58.3(1.4)	61.0(1.7)	66.5(1.2)	10.0(1.5)	8.2(1.9)	5.5(2.1)
BLACK	14.9(1.7)	17.1(1.9)	19.6(2.8)	24.3(3.3)	9.4(3.7)	7.1(3.8)	4.7(4.3)
HISPANIC	18.1(1.8)	24.1(5.1)	24.9(4.3)	30.0(2.8)	11.9(3.3)	5.8(5.8)	5.0(5.1)
OTHER	35.6(4.9)	64.8(7.1)	52.6(6.6)	47.1(10.2)	11.5(11.3)	-17.7(12.4)	-5.4(12.2)
REGION							
NORTHEAST	56.1(2.0)	55.1(2.7)	59.0(4.0)	58.1(2.7)	2.0(3.3)	3.0(3.8)	-1.0(4.8)
SOUTHEAST	37.5(1.6)	40.1(2.3)	48.6(3.3)	52.7(2.7)	15.2(3.1)	12.7(3.5)	4.1(4.3)
CENTRAL	54.8(2.0)	54.1(3.5)	49.5(6.3)	62.7(3.1)	7.9(3.6)	8.6(4.7)	13.2(7.0)
WEST	44.5(2.4)	53.0(3.3)	53.3(2.8)	53.2(2.2)	8.7(3.3)	0.3(4.0)	-0.1(3.6)
TYPE OF COMMUNITY							
EXTREME RURAL	46.0(3.4)	44.5(4.0)	60.3(3.6)	49.6(5.1)	3.7(6.2)	5.1(6.5)	-10.7(6.3)
DISADVANTAGED URBAN	21.3(1.9)	22.9(3.7)	21.0(3.4)	26.8(3.9)	5.5(4.3)	3.9(5.4)	5.8(5.1)
ADVANTAGED URBAN	68.2(1.5)	77.8(3.2)	68.4(3.8)	70.3(2.7)	2.2(3.0)	-7.5(4.1)	1.9(4.6)
OTHER	48.3(1.1)	51.7(1.4)	53.1(1.6)	60.3(1.5)	12.0(1.8)	8.5(2.1)	7.2(2.2)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	26.0(1.2)	24.2(2.1)	28.6(3.5)	31.1(2.4)	5.1(2.7)	6.8(3.2)	2.5(4.2)
GRADUATED H.S.	46.4(1.4)	43.1(2.0)	44.4(2.0)	47.4(1.7)	1.1(2.2)	4.3(2.6)	3.1(2.6)
SOME EDUC AFTER H.S.	61.0(1.5)	60.3(2.3)	61.0(2.4)	65.3(1.9)	4.3(2.4)	5.0(3.0)	4.3(3.0)
GRADUATED COLLEGE	67.1(1.1)	65.6(1.9)	67.0(2.1)	70.2(1.4)	3.1(1.8)	4.7(2.4)	3.2(2.5)
UNKNOWN	25.7(2.1)	28.0(3.0)	23.9(2.6)	23.3(2.3)	-2.4(3.1)	-4.7(3.9)	-0.6(3.5)
TYPE OF SCHOOL							
PUBLIC	46.7(1.2)	49.2(1.8)	51.9(1.7)	54.7(1.2)	8.0(1.7)	5.6(2.1)	2.9(2.0)
PRIVATE	68.8(2.6)	65.8(4.1)	66.8(8.2)	72.0(2.6)	3.2(3.7)	6.1(4.9)	5.2(8.6)
QUARTILES							
UPPER	92.0(0.5)	95.1(0.6)	97.8(0.5)	99.1(0.3)	7.1(0.6)	4.0(0.7)	1.3(0.6)
MIDDLE TWO	49.0(1.0)	51.8(1.3)	54.5(1.9)	61.6(1.1)	12.6(1.5)	9.8(1.8)	7.0(2.2)
LOWER	5.3(0.5)	5.2(0.8)	3.2(0.9)	3.9(0.8)	-1.4(0.9)	-1.3(1.1)	0.7(1.2)

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Percentage of Students with Science Proficiency At or Above Anchor Level 300

	1976-77	1981-82	1985-86	1989-90	DIFFERENCE 1977-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	11.1(0.5)	9.6(0.7)	9.1(0.9)	11.2(0.6)	0.2(0.8)	1.6(1.0)	2.2(1.1)
SEX							
MALE	13.1(0.6)	12.6(1.1)	11.9(1.3)	14.0(0.9)	0.9(1.1)	1.4(1.4)	2.1(1.5)
FEMALE	9.0(0.5)	6.9(0.7)	6.3(1.1)	8.5(0.6)	-0.5(0.8)	1.6(1.0)	2.2(1.3)
RACE/ETHNICITY							
WHITE	13.4(0.5)	11.5(0.8)	11.3(1.2)	14.2(0.8)	0.9(1.0)	2.7(1.1)	2.9(1.5)
BLACK	1.2(0.4)	0.8(0.3)	1.1(0.4)	1.5(0.5)	0.2(0.6)	0.6(0.6)	0.4(0.6)
HISPANIC	1.8(0.[illegible])	2.4(0.9)	1.5(0.7)	3.3(0.8)	1.5(1.2)	0.8(1.2)	1.8(1.1)
OTHER	5.6(2.0)	15.9(3.5)	7.4(2.8)	9.1(4.6)	3.5(5.0)	-6.8(5.8)	1.7(5.4)
REGION							
NORTHEAST	13.8(1.0)	11.2(1.3)	12.4(2.2)	12.6(1.6)	-1.2(1.9)	1.4(2.1)	0.2(2.7)
SOUTHEAST	7.1(0.7)	5.1(0.6)	6.5(1.1)	8.8(0.9)	1.7(1.1)	3.7(1.1)	2.3(1.4)
CENTRAL	13.2(1.0)	10.7(1.4)	7.4(1.6)	13.3(1.4)	0.1(1.7)	2.5(1.9)	5.8(2.1)
WEST	9.4(0.8)	10.9(1.6)	10.2(1.7)	10.4(1.3)	1.0(1.5)	-0.5(2.0)	0.2(2.2)
TYPE OF COMMUNITY							
EXTREME RURAL	9.0(1.4)	7.3(2.6)	9.0(2.2)	7.3(1.6)	-1.7(2.2)	0.0(3.1)	-1.7(2.7)
DISADVANTAGED URBAN	2.5(0.4)	2.0(0.9)	1.7(0.6)	2.5(0.8)	0.0(0.9)	0.5(1.1)	0.8(1.0)
ADVANTAGED URBAN	20.0(1.6)	23.9(2.5)	17.3(3.3)	17.6(1.9)	-2.4(2.4)	-6.3(3.1)	0.3(3.8)
OTHER	10.6(0.4)	9.1(0.7)	8.7(1.0)	12.3(0.9)	1.7(1.0)	3.2(1.1)	3.6(1.4)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	2.9(0.4)	1.8(0.8)	1.9(1.1)	2.5(0.8)	-0.4(0.9)	0.7(1.2)	0.6(1.4)
GRADUATED H.S.	8.4(0.6)	4.9(0.7)	4.5(1.0)	6.3(1.0)	-2.1(1.1)	1.4(1.2)	1.8(1.4)
SOME EDUC AFTER H.S.	15.7(1.1)	12.4(1.6)	9.5(1.3)	12.8(1.1)	-2.9(1.6)	0.4(1.9)	3.3(1.7)
GRADUATED COLLEGE	19.6(0.9)	15.7(1.3)	15.7(2.0)	17.4(1.1)	-2.2(1.4)	1.7(1.6)	1.7(2.2)
UNKNOWN	3.1(0.4)	2.6(0.8)	2.2(0.9)	1.7(0.7)	-1.4(0.8)	-0.8(1.1)	-0.4(1.1)
TYPE OF SCHOOL							
PUBLIC	10.2(0.5)	8.9(0.8)	8.9(0.9)	10.7(0.7)	0.5(0.9)	1.8(1.1)	1.7(1.1)
PRIVATE	19.6(1.9)	16.0(2.4)	12.8(3.6)	16.2(1.5)	-3.4(2.4)	0.2(2.8)	3.4(3.8)
QUARTILES							
UPPER	36.5(0.8)	33.8(2.0)	34.2(3.2)	41.6(1.5)	5.1(1.7)	7.8(2.5)	7.3(3.6)
MIDDLE TWO	3.9(0.4)	2.4(0.4)	1.1(0.3)	1.6(0.4)	-2.2(0.6)	-0.7(0.6)	0.6(0.5)
LOWER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)

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Percentage of Students with Science Proficiency At or Above Anchor Level 350

	1976-77	1981-82	1985-86	1989-90	DIFFERENCE 1977-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	0.7(0.1)	0.4(0.1)	0.2(0.1)	0.4(0.1)	-0.3(0.1)	0.0(0.2)	0.2(0.1)
SEX							
MALE	0.9(0.2)	0.5(0.2)	0.3(0.2)	0.6(0.2)	-0.3(0.3)	0.1(0.3)	0.3(0.3)
FEMALE	0.4(0.1)	0.2(0.1)	0.1(0.1)	0.2(0.1)	-0.3(0.2)	0.0(0.2)	0.0(0.2)
RACE/ETHNICITY							
WHITE	0.8(0.1)	0.4(0.1)	0.3(0.1)	0.5(0.1)	-0.3(0.2)	0.0(0.2)	0.2(0.2)
BLACK	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.1(0.0)	0.0(0.1)	0.1(0.1)	0.1(0.1)
HISPANIC	0.0(0.1)	0.0(0.1)	0.0(0.1)	0.1(0.1)	0.0(0.2)	0.0(0.2)	0.1(0.2)
OTHER	0.1(0.5)	0.8(1.0)	0.2(0.5)	0.7(1.7)	0.6(1.7)	-0.1(1.9)	0.5(1.8)
REGION							
NORTHEAST	0.9(0.3)	0.5(0.2)	0.5(0.3)	0.4(0.2)	-0.5(0.3)	0.0(0.3)	-0.1(0.4)
SOUTHEAST	0.3(0.1)	0.1(0.1)	0.1(0.1)	0.4(0.2)	0.1(0.2)	0.3(0.2)	0.3(0.2)
CENTRAL	1.0(0.3)	0.4(0.4)	0.1(0.2)	0.5(0.3)	-0.4(0.4)	0.1(0.5)	0.4(0.3)
WEST	0.4(0.1)	0.4(0.3)	0.2(0.2)	0.3(0.2)	-0.1(0.2)	-0.1(0.3)	0.0(0.3)
TYPE OF COMMUNITY							
EXTREME RURAL	0.5(0.3)	0.4(1.0)	0.1(0.5)	0.3(0.3)	-0.2(0.4)	-0.1(1.0)	0.2(0.6)
DISADVANTAGED URBAN	0.1(0.1)	0.1(0.1)	0.0(0.1)	0.1(0.2)	0.0(0.2)	0.0(0.2)	0.1(0.2)
ADVANTAGED URBAN	1.6(0.3)	1.2(0.6)	0.7(0.5)	1.4(0.7)	-0.2(0.7)	0.7(0.9)	0.6(0.8)
OTHER	0.6(0.1)	0.3(0.1)	0.2(0.1)	0.3(0.1)	-0.2(0.2)	0.0(0.1)	0.1(0.2)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	0.1(0.1)	0.0(0.1)	0.0(0.1)	0.1(0.2)	-0.1(0.2)	0.1(0.2)	0.1(0.2)
GRADUATED H.S.	0.3(0.1)	0.1(0.1)	0.0(0.1)	0.1(0.1)	-0.3(0.2)	0.0(0.2)	0.0(0.2)
SOME EDUC AFTER H.S.	1.0(0.2)	0.4(0.6)	0.1(0.1)	0.3(0.2)	-0.6(0.3)	-0.1(0.7)	0.2(0.3)
GRADUATED COLLEGE	1.4(0.3)	0.7(0.2)	0.5(0.2)	0.8(0.3)	-0.6(0.4)	0.1(0.3)	0.2(0.3)
UNKNOWN	0.1(0.1)	0.0(0.1)	0.0(0.1)	0.0(0.1)	-0.1(0.2)	0.0(0.2)	0.0(0.2)
TYPE OF SCHOOL							
PUBLIC	0.6(0.1)	0.3(0.1)	0.2(0.1)	0.4(0.1)	-0.2(0.1)	0.1(0.2)	0.1(0.2)
PRIVATE	1.6(0.3)	0.8(0.5)	0.3(0.7)	0.5(0.5)	-1.1(0.6)	-0.3(0.7)	0.2(0.8)
QUARTILES							
UPPER	2.6(0.4)	1.4(0.4)	0.9(0.4)	1.6(0.4)	-1.0(0.5)	0.2(0.6)	0.6(0.6)
MIDDLE TWO	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
LOWER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)

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Percentage of Students with Science Proficiency At or Above Anchor Level 150

	1976-77	1981-82	1985-86	1989-90	DIFFERENCE 1977-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	99.8(0.0)	99.7(0.1)	99.9(0.1)	99.9(0.2)	0.1(0.2)	0.2(0.2)	0.0(0.2)
SEX							
MALE	99.9(0.0)	99.8(0.1)	99.9(0.1)	99.9(0.2)	0.0(0.2)	0.1(0.2)	0.0(0.2)
FEMALE	99.7(0.1)	99.6(0.1)	99.9(0.1)	99.9(0.2)	0.1(0.2)	0.3(0.2)	0.0(0.2)
RACE/ETHNICITY							
WHITE	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
BLACK	98.5(0.3)	97.9(0.5)	99.7(0.4)	99.4(0.7)	0.9(0.8)	1.5(0.9)	-0.3(0.8)
HISPANIC	99.7(0.2)	98.9(0.9)	99.8(0.9)	99.6(0.9)	-0.1(0.9)	0.7(1.3)	-0.2(1.3)
OTHER	99.9(0.0)	99.8(0.4)	99.2(1.0)	99.9(1.0)	0.0(1.0)	0.1(1.1)	0.7(1.4)
REGION							
NORTHEAST	99.9(0.1)	99.6(0.2)	99.9(0.3)	99.8(0.4)	-0.1(0.4)	0.2(0.4)	-0.1(0.4)
SOUTHEAST	99.5(0.2)	99.5(0.3)	99.9(0.3)	99.9(0.2)	0.4(0.3)	0.4(0.4)	-0.1(0.4)
CENTRAL	99.9(0.0)	99.8(0.2)	100.0(0.2)	99.9(0.2)	0.0(0.2)	0.0(0.3)	-0.1(0.3)
WEST	99.9(0.0)	99.7(0.2)	99.8(0.2)	99.9(0.2)	0.0(0.2)	0.2(0.3)	0.1(0.3)
TYPE OF COMMUNITY							
EXTREME RURAL	99.9(0.0)	99.8(0.2)	100.0(0.2)	99.9(0.4)	0.0(0.4)	0.1(0.4)	-0.1(0.4)
DISADVANTAGED URBAN	99.0(0.3)	98.2(0.9)	99.3(0.9)	99.2(0.8)	0.2(0.9)	1.1(1.2)	-0.1(1.2)
ADVANTAGED URBAN	100.0(0.0)	100.0(0.1)	100.0(0.1)	99.9(0.1)	0.0(0.1)	0.0(0.2)	0.0(0.2)
OTHER	99.8(0.0)	99.8(0.1)	99.9(0.1)	99.9(0.1)	0.1(0.1)	0.1(0.1)	0.0(0.1)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	99.5(0.2)	99.1(0.4)	99.6(0.5)	99.5(0.7)	0.0(0.7)	0.3(0.8)	-0.1(0.9)
GRADUATED H.S.	99.9(0.0)	99.6(0.2)	99.9(0.1)	99.9(0.3)	0.0(0.3)	0.2(0.3)	-0.1(0.3)
SOME EDUC AFTER H.S.	100.0(0.0)	99.9(0.1)	100.0(0.1)	100.0(0.1)	0.0(0.1)	0.1(0.1)	0.0(0.1)
GRADUATED COLLEGE	100.0(0.0)	100.0(0.0)	100.0(0.1)	100.0(0.1)	0.0(0.1)	0.0(0.1)	0.0(0.1)
UNKNOWN	98.4(0.6)	98.3(1.1)	98.7(1.2)	98.6(2.6)	0.3(2.7)	0.4(2.8)	-0.1(2.9)
TYPE OF SCHOOL							
PUBLIC	99.8(0.0)	99.6(0.1)	99.9(0.1)	99.8(0.2)	0.1(0.2)	0.2(0.2)	0.0(0.2)
PRIVATE	100.0(0.0)	99.9(0.1)	100.0(0.1)	100.0(0.1)	0.0(0.1)	0.1(0.2)	0.0(0.2)
QUARTILES							
UPPER	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
MIDDLE TWO	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
LOWER	99.2(0.2)	98.7(0.3)	99.6(0.3)	99.4(0.6)	0.2(0.6)	0.7(0.7)	-0.2(0.7)

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Percentage of Students with Science Proficiency At or Above Anchor Level 200

	1976-77	1981-82	1985-86	1989-90	DIFFERENCE 1977-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	97.1(0.2)	95.7(0.5)	97.1(0.5)	96.7(0.3)	-0.4(0.4)	1.1(0.6)	-0.4(0.6)
SEX							
MALE	97.8(0.2)	96.8(0.5)	97.4(0.7)	96.8(0.5)	-1.0(0.6)	0.0(0.7)	-0.6(0.9)
FEMALE	96.4(0.3)	94.6(0.8)	96.9(0.5)	96.6(0.6)	0.2(0.7)	2.0(1.0)	-0.2(0.8)
RACE/ETHNICITY							
WHITE	99.2(0.1)	98.6(0.2)	98.8(0.3)	99.0(0.2)	-0.2(0.3)	0.4(0.3)	0.2(0.4)
BLACK	83.6(1.3)	79.7(1.9)	90.9(2.1)	88.3(1.9)	4.6(2.3)	8.6(2.6)	-2.6(2.8)
HISPANIC	93.1(1.7)	86.9(2.9)	93.3(2.4)	91.9(2.2)	-1.2(2.8)	5.0(3.6)	-1.4(3.3)
OTHER	97.1(1.8)	95.1(2.2)	89.3(4.8)	96.3(1.6)	-0.8(2.4)	1.2(2.7)	7.0(5.1)
REGION							
NORTHEAST	98.0(0.4)	95.7(0.9)	97.1(1.5)	96.4(1.1)	-1.7(1.1)	0.6(1.4)	-0.8(1.8)
SOUTHEAST	94.2(0.7)	93.9(1.5)	96.6(1.2)	95.8(0.6)	1.6(1.0)	2.0(1.6)	-0.8(1.3)
CENTRAL	98.0(0.3)	97.4(0.7)	98.4(0.5)	97.8(0.7)	-0.2(0.7)	0.4(0.9)	-0.6(0.8)
WEST	97.3(0.3)	95.0(0.9)	96.3(0.9)	96.7(0.6)	-0.5(0.7)	1.7(1.1)	0.5(1.1)
TYPE OF COMMUNITY							
EXTREME RURAL	98.1(0.6)	96.3(1.2)	98.9(2.3)	97.4(1.3)	-0.7(1.5)	1.1(1.8)	-1.5(2.7)
DISADVANTAGED URBAN	88.6(1.4)	84.8(3.1)	85.4(4.0)	86.8(3.3)	-1.7(3.6)	2.1(4.5)	1.5(5.1)
ADVANTAGED URBAN	99.0(0.4)	98.5(0.5)	99.0(1.6)	98.8(0.9)	-0.3(1.0)	0.2(1.0)	-0.3(1.8)
OTHER	97.6(0.2)	96.4(0.6)	97.7(0.5)	97.6(0.3)	0.0(0.4)	1.2(0.7)	-0.1(0.6)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	93.1(0.8)	90.1(1.6)	91.7(2.3)	91.7(2.2)	-1.4(2.3)	1.6(2.7)	-0.1(3.1)
GRADUATED H.S.	97.3(0.3)	95.2(0.8)	96.7(0.9)	94.9(1.0)	-2.4(1.1)	-0.3(1.3)	-1.7(1.4)
SOME EDUC AFTER H.S.	98.9(0.2)	98.0(0.4)	98.6(0.8)	98.7(0.5)	-0.2(0.6)	0.7(0.7)	0.1(1.0)
GRADUATED COLLEGE	99.5(0.1)	98.2(0.3)	99.2(0.3)	98.7(0.3)	-0.8(0.4)	0.5(0.5)	-0.5(0.5)
UNKNOWN	85.8(1.6)	85.4(3.2)	83.9(5.0)	84.8(5.0)	-1.0(5.3)	-0.6(6.0)	0.9(7.1)
TYPE OF SCHOOL							
PUBLIC	97.0(0.2)	95.4(0.6)	97.0(0.5)	96.5(0.4)	-0.5(0.4)	1.1(0.7)	-0.5(0.7)
PRIVATE	99.5(0.2)	97.9(0.7)	99.8(0.6)	99.5(0.5)	0.1(0.6)	1.7(0.9)	-0.3(0.8)
QUARTILES							
UPPER	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
MIDDLE TWO	99.9(0.1)	99.7(0.1)	100.0(0.1)	100.0(0.1)	0.1(0.2)	0.3(0.2)	0.0(0.2)
LOWER	88.7(0.7)	83.2(1.6)	88.5(1.7)	86.8(1.2)	-1.9(1.4)	3.6(2.0)	-1.7(2.1)

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Percentage of Students with Science Proficiency At or Above Anchor Level 250

	1976-77	1981-82	1985-86	1989-90	DIFFERENCE 1977-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	81.6(0.7)	76.6(1.0)	80.7(1.3)	81.2(0.9)	-0.4(1.2)	4.6(1.4)	0.4(1.6)
SEX							
MALE	85.2(0.7)	81.2(1.2)	82.4(1.4)	82.5(1.2)	-2.7(1.4)	1.3(1.7)	0.1(1.9)
FEMALE	78.0(1.0)	72.2(1.3)	79.1(1.7)	79.9(1.4)	1.9(1.7)	7.7(1.9)	0.8(2.2)
RACE/ETHNICITY							
WHITE	88.2(0.4)	84.9(0.9)	87.8(1.4)	89.6(0.8)	1.4(0.9)	4.7(1.2)	1.8(1.6)
BLACK	40.5(1.5)	35.0(2.1)	52.2(3.2)	51.4(3.7)	11.0(4.0)	16.5(4.3)	-0.7(4.9)
HISPANIC	61.5(1.7)	48.0(2.7)	60.0(7.2)	59.9(5.0)	-1.6(5.3)	11.8(5.7)	-0.1(8.8)
OTHER	78.7(2.9)	65.4(5.8)	71.0(7.0)	79.2(3.8)	0.5(4.8)	13.8(6.9)	8.2(8.0)
REGION							
NORTHEAST	85.4(1.6)	77.5(1.9)	80.8(3.9)	82.1(2.8)	-3.3(3.3)	4.5(3.4)	1.3(4.8)
SOUTHEAST	72.2(1.5)	71.2(2.3)	76.9(1.9)	76.8(2.2)	4.6(2.6)	5.6(3.2)	-0.1(2.9)
CENTRAL	85.1(1.1)	81.1(2.[illegible])	85.7(1.8)	86.9(2.0)	1.8(2.3)	5.8(3.1)	1.2(2.7)
WEST	79.9(1.2)	74.8(2.3)	78.8(3.0)	79.0(1.9)	-1.0(2.2)	4.2(3.2)	0.2(3.5)
TYPE OF COMMUNITY							
EXTREME RURAL	83.3(2.1)	77.8(2.8)	86.4(6.3)	84.8(2.7)	1.5(3.4)	7.0(3.9)	-1.6(6.8)
DISADVANTAGED URBAN	54.6(2.9)	48.9(5.1)	41.0(3.9)	51.6(6.4)	-3.0(7.0)	2.7(8.2)	10.7(7.5)
ADVANTAGED URBAN	90.0(1.8)	89.7(1.2)	87.7(5.3)	89.9(2.7)	0.0(3.2)	0.2(2.9)	2.2(5.9)
OTHER	82.9(0.7)	77.9(1.3)	82.6(1.4)	83.3(1.0)	0.3(1.3)	5.4(1.7)	0.7(1.7)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	64.8(1.5)	58.2(2.6)	59.8(3.5)	62.0(4.3)	-2.8(4.6)	3.9(5.1)	2.3(5.5)
GRADUATED H.S.	80.0(1.0)	72.3(1.5)	74.1(2.1)	73.4(1.5)	-6.6(1.8)	1.0(2.2)	-0.7(2.6)
SOME EDUC AFTER H.S.	87.0(0.8)	83.1(1.4)	86.8(1.9)	88.1(1.6)	1.1(1.8)	5.0(2.1)	1.3(2.5)
GRADUATED COLLEGE	92.9(0.5)	86.7(1.4)	89.6(1.4)	88.9(1.1)	-4.0(1.2)	2.2(1.8)	-0.7(1.8)
UNKNOWN	52.7(2.6)	52.1(4.2)	47.4(7.9)	48.5(5.5)	-4.2(6.1)	-3.6(6.9)	1.1(9.6)
TYPE OF SCHOOL							
PUBLIC	80.8(0.7)	75.8(1.0)	80.1(1.4)	80.4(0.9)	-0.3(1.2)	4.7(1.4)	0.4(1.7)
PRIVATE	92.9(1.2)	83.5(2.8)	96.5(2.2)	90.6(4.1)	-2.3(4.3)	7.1(5.0)	-5.9(4.7)
QUARTILES							
UPPER	99.7(0.1)	99.5(0.2)	100.0(0.2)	100.0(0.2)	0.3(0.2)	0.5(0.3)	0.0(0.3)
MIDDLE TWO	91.9(0.4)	88.1(0.7)	95.8(0.6)	96.5(0.6)	4.5(0.7)	8.4(0.9)	0.7(0.8)
LOWER	42.6(1.1)	30.5(1.5)	31.2(2.4)	31.7(2.2)	-10.9(2.5)	1.2(2.7)	0.5(3.2)

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Percentage of Students with Science Proficiency At or Above Anchor Level 300

	1976-77	1981-82	1985-86	1989-90	DIFFERENCE 1977-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	41.7(0.9)	37.3(0.9)	41.3(1.4)	43.3(1.3)	1.6(1.6)	6.0(1.6)	2.0(1.9)
SEX							
MALE	48.8(1.1)	45.2(1.2)	48.8(2.1)	48.2(1.6)	-0.6(1.9)	3.0(2.0)	-0.6(2.6)
FEMALE	34.8(1.0)	29.9(1.2)	34.1(1.5)	38.7(1.7)	3.9(2.0)	8.9(2.1)	4.6(2.2)
RACE/ETHNICITY							
WHITE	47.5(0.7)	43.9(1.1)	48.7(1.7)	51.2(1.5)	3.7(1.7)	7.3(1.9)	2.5(2.3)
BLACK	7.7(1.0)	6.5(1.1)	12.5(2.2)	15.7(4.0)	8.0(4.2)	9.2(4.2)	3.1(4.6)
HISPANIC	18.5(2.1)	11.1(2.0)	14.8(2.9)	21.1(3.3)	2.6(3.9)	10.1(3.9)	6.4(4.4)
OTHER	36.6(3.8)	25.2(4.8)	35.0(8.1)	45.2(6.5)	8.6(7.5)	19.9(8.0)	10.1(10.4)
REGION							
NORTHEAST	47.9(1.8)	38.3(1.9)	46.6(4.0)	45.7(2.7)	-2.2(3.3)	7.4(3.3)	-0.9(4.8)
SOUTHEAST	31.6(1.8)	32.2(2.2)	37.0(2.0)	37.5(2.7)	5.9(3.2)	5.3(3.4)	0.5(3.3)
CENTRAL	45.0(1.3)	42.1(2.2)	45.0(2.5)	51.7(3.1)	6.7(3.3)	9.6(3.8)	6.7(3.9)
WEST	38.6(1.4)	35.0(2.2)	36.3(3.5)	38.7(2.5)	0.2(2.9)	3.7(3.3)	2.5(4.3)
TYPE OF COMMUNITY							
EXTREME RURAL	39.9(2.3)	36.7(2.9)	43.6(6.0)	46.1(3.7)	6.2(4.3)	9.5(4.7)	2.5(7.1)
DISADVANTAGED URBAN	18.2(1.9)	15.3(2.5)	7.4(1.6)	18.0(5.3)	-0.2(5.6)	2.7(5.8)	10.6(5.5)
ADVANTAGED URBAN	55.0(3.2)	56.1(1.8)	53.6(7.1)	55.5(4.7)	0.5(5.7)	-0.6(5.0)	1.9(8.5)
OTHER	42.3(0.8)	37.5(1.1)	41.9(1.6)	44.5(1.5)	2.2(1.7)	7.0(1.9)	2.5(2.2)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	21.6(1.0)	17.3(1.7)	14.9(2.4)	18.2(2.8)	-3.3(3.0)	1.0(3.2)	3.4(3.7)
GRADUATED H.S.	35.8(0.8)	29.5(1.3)	29.5(2.0)	30.8(1.5)	-5.0(1.7)	1.3(2.0)	1.3(2.5)
SOME EDUC AFTER H.S.	46.0(1.3)	41.6(2.1)	46.7(3.0)	46.7(1.9)	0.8(2.3)	5.1(2.8)	0.0(3.6)
GRADUATED COLLEGE	59.6(1.2)	52.5(1.9)	55.3(2.4)	57.3(2.0)	-2.3(2.4)	4.8(2.8)	2.0(3.1)
UNKNOWN	16.6(2.3)	15.5(2.9)	11.4(4.4)	13.5(3.9)	-3.1(4.5)	-2.1(4.9)	2.0(5.8)
TYPE OF SCHOOL							
PUBLIC	40.5(0.8)	36.6(0.9)	39.9(1.5)	42.0(1.3)	1.5(1.5)	5.5(1.6)	2.1(2.0)
PRIVATE	58.9(2.8)	44.2(2.6)	74.6(10.9)	59.8(6.7)	1.0(7.2)	15.7(7.1)	-14.7(12.8)
QUARTILES							
UPPER	86.6(0.9)	82.8(1.3)	96.7(1.0)	98.4(0.5)	11.8(1.0)	15.6(1.4)	1.7(1.2)
MIDDLE TWO	38.2(0.9)	32.5(1.1)	34.1(1.2)	37.3(1.6)	-0.9(1.8)	4.8(1.9)	3.2(2.0)
LOWER	3.8(0.4)	1.7(0.3)	0.3(0.3)	0.4(0.4)	-3.4(0.5)	-1.3(0.5)	0.2(0.5)

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Percentage of Students with Science Proficiency At or Above Anchor Level 350

	1976-77	1981-82	1985-86	1989-90	DIFFERENCE 1977-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	8.5(0.4)	7.1(0.4)	7.9(0.7)	9.2(0.5)	0.7(0.6)	2.1(0.6)	1.3(0.8)
SEX							
MALE	11.8(0.6)	10.4(0.8)	11.4(1.3)	13.0(0.8)	1.3(1.0)	2.6(1.2)	1.7(1.5)
FEMALE	5.3(0.4)	3.9(0.4)	4.5(0.8)	5.5(0.5)	0.2(0.6)	1.6(0.6)	1.0(1.0)
RACE/ETHNICITY							
WHITE	10.0(0.4)	8.6(0.6)	9.6(0.9)	11.4(0.7)	1.4(0.8)	2.8(0.9)	1.7(1.1)
BLACK	0.4(0.2)	0.2(0.2)	0.9(0.6)	1.5(0.8)	1.0(0.8)	1.2(0.8)	0.5(1.0)
HISPANIC	1.8(0.6)	1.4(0.9)	1.1(0.7)	2.1(1.6)	0.4(1.7)	0.7(1.9)	1.1(1.8)
OTHER	6.3(2.2)	2.8(1.9)	8.6(6.9)	11.6(4.1)	5.3(4.7)	8.8(4.5)	2.9(8.1)
REGION							
NORTHEAST	10.8(0.9)	7.6(0.9)	10.8(1.9)	10.2(1.1)	-0.6(1.5)	2.7(1.5)	-0.5(2.2)
SOUTHEAST	5.2(0.7)	5.7(0.9)	6.0(1.2)	6.7(1.0)	1.5(1.2)	1.0(1.4)	0.7(1.6)
CENTRAL	9.6(0.6)	7.9(1.2)	8.7(1.7)	12.5(1.2)	2.9(1.4)	4.6(1.8)	3.8(2.1)
WEST	7.2(0.8)	6.7(0.8)	5.9(1.7)	7.4(1.1)	0.2(1.3)	0.7(1.3)	1.4(2.0)
TYPE OF COMMUNITY							
EXTREME RURAL	6.5(1.1)	5.8(1.4)	9.4(2.6)	8.5(1.8)	2.0(2.1)	2.7(2.2)	-0.9(3.1)
DISADVANTAGED URBAN	2.7(0.8)	1.5(0.7)	0.3(0.6)	2.7(1.2)	0.0(1.4)	1.2(1.4)	2.3(1.4)
ADVANTAGED URBAN	13.9(1.5)	13.9(2.0)	13.3(3.0)	15.0(2.8)	1.1(3.2)	1.1(3.4)	1.7(4.1)
OTHER	8.5(0.4)	7.0(0.5)	7.5(0.7)	9.3(0.7)	0.8(0.8)	2.3(0.9)	1.8(1.0)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	2.2(0.3)	1.9(0.6)	0.7(0.6)	1.3(0.7)	-0.9(0.8)	-0.6(0.9)	0.6(1.0)
GRADUATED H.S.	5.7(0.3)	3.9(0.7)	3.7(0.8)	3.8(0.8)	-1.8(0.8)	-0.1(1.1)	0.1(1.1)
SOME EDUC AFTER H.S.	8.7(0.8)	7.4(1.2)	8.0(1.4)	8.8(0.9)	0.1(1.2)	1.4(1.6)	0.8(1.7)
GRADUATED COLLEGE	15.7(0.8)	12.4(0.8)	13.2(1.4)	15.3(0.9)	-0.3(1.2)	2.9(1.3)	2.2(1.6)
UNKNOWN	1.7(0.6)	1.8(1.0)	1.0(2.3)	0.8(1.2)	-0.9(1.4)	-0.9(1.6)	-0.2(2.6)
TYPE OF SCHOOL							
PUBLIC	8.1(0.4)	6.9(0.4)	7.2(0.7)	8.7(0.5)	0.6(0.6)	1.8(0.6)	1.4(0.8)
PRIVATE	14.8(1.9)	8.5(2.3)	23.1(7.7)	15.8(3.2)	1.1(3.7)	7.3(3.9)	-7.3(8.3)
QUARTILES							
UPPER	29.2(1.1)	24.5(1.4)	31.1(2.0)	36.3(1.5)	7.1(1.8)	11.8(2.1)	5.1(2.5)
MIDDLE TWO	2.4(0.2)	1.9(0.2)	0.2(0.1)	0.2(0.2)	-2.2(0.3)	-1.7(0.3)	0.1(0.2)
LOWER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)

NAEP 1990 SCIENCE TREND ASSESSMENT—AGE 9

Mean Proficiencies, Standard Deviations, and Percentiles

	1977	1982	1986	1990
TOTAL SAMPLE				
MEAN	219.9 (1.2)	220.8 (1.8)	224.3 (1.2)	228.7 (0.8)
ST. DEV.	44.9 (0.6)	40.9 (1.4)	41.6 (0.6)	40.2 (0.4)
PERCENTILES				
5	143.8 (2.3)	150.9 (4.9)	155.0 (1.3)	159.8 (1.3)
10	160.9 (2.1)	166.8 (2.6)	169.9 (1.8)	176.1 (1.1)
25	190.1 (1.6)	194.4 (2.2)	195.9 (1.3)	202.0 (1.4)
50	221.5 (1.1)	221.4 (2.4)	225.1 (1.7)	230.3 (0.9)
75	251.0 (1.1)	249.0 (2.0)	253.1 (1.7)	256.6 (0.8)
90	276.5 (1.2)	272.4 (3.9)	276.9 (2.0)	278.8 (1.3)
95	291.4 (1.2)	286.4 (3.7)	290.9 (1.9)	292.1 (1.4)
MALE STUDENTS				
MEAN	222.1 (1.3)	221.0 (2.3)	227.3 (1.4)	230.3 (1.1)
ST. DEV.	45.0 (0.7)	42.0 (2.0)	41.9 (0.7)	41.9 (0.6)
PERCENTILES				
5	146.8 (2.6)	150.4 (5.5)	158.0 (3.6)	159.6 (2.2)
10	163.2 (1.9)	166.5 (3.8)	172.9 (1.8)	176.3 (2.3)
25	191.9 (1.9)	193.5 (4.1)	198.7 (1.8)	202.1 (2.5)
50	223.6 (1.4)	221.3 (3.6)	227.9 (1.7)	231.6 (1.9)
75	253.4 (1.4)	250.4 (3.1)	256.1 (1.9)	259.4 (1.0)
90	279.1 (1.3)	274.7 (4.3)	280.3 (2.0)	283.3 (1.8)
95	294.2 (1.5)	287.1 (5.3)	294.8 (2.7)	296.3 (2.4)
FEMALE STUDENTS				
MEAN	217.6 (1.2)	220.7 (2.0)	221.3 (1.4)	227.1 (1.0)
ST. DEV.	44.6 (0.8)	39.8 (1.3)	41.1 (0.8)	38.4 (0.5)
PERCENTILES				
5	141.3 (3.5)	151.2 (6.6)	152.5 (2.5)	159.9 (2.4)
10	158.5 (2.2)	167.5 (3.1)	166.9 (2.6)	175.8 (2.2)
25	188.3 (1.4)	195.3 (2.6)	193.2 (1.8)	201.9 (1.2)
50	219.5 (1.2)	221.4 (3.6)	222.5 (2.0)	229.2 (1.1)
75	248.6 (1.1)	247.4 (2.4)	250.2 (1.9)	254.0 (1.1)
90	273.8 (1.6)	270.6 (3.4)	273.3 (1.6)	274.6 (1.9)
95	288.2 (1.6)	284.4 (3.3)	287.0 (2.6)	287.0 (1.9)
WHITE STUDENTS				
MEAN	229.6 (0.9)	229.0 (1.9)	231.9 (1.2)	237.5 (0.8)
ST. DEV.	40.0 (0.5)	37.6 (1.3)	39.2 (0.7)	36.3 (0.4)
PERCENTILES				
5	163.2 (1.3)	167.0 (3.0)	166.5 (2.3)	176.9 (1.4)
10	177.6 (1.1)	182.2 (3.1)	181.0 (1.5)	189.9 (1.3)
25	202.4 (1.1)	203.8 (2.6)	205.5 (1.5)	212.6 (0.8)
50	229.8 (0.9)	228.6 (2.4)	232.5 (1.6)	238.3 (1.0)
75	256.9 (0.8)	254.9 (2.0)	258.8 (1.4)	262.3 (1.0)
90	281.1 (1.1)	277.6 (2.8)	281.7 (1.7)	283.5 (1.4)
95	295.4 (1.9)	290.8 (4.0)	294.9 (2.5)	295.7 (1.3)
BLACK STUDENTS				
MEAN	174.8 (1.8)	187.0 (3.0)	196.2 (1.9)	196.4 (2.0)
ST. DEV.	41.4 (1.0)	37.7 (1.9)	38.3 (1.0)	38.6 (1.0)
PERCENTILES				
5	107.0 (3.5)	123.6 (11.0)	132.8 (3.2)	131.3 (4.2)
10	122.8 (3.4)	136.7 (8.3)	146.9 (3.5)	145.3 (3.8)
25	146.6 (2.4)	159.2 (4.9)	169.7 (2.6)	169.8 (2.6)
50	173.8 (2.5)	188.2 (5.0)	195.9 (2.2)	196.3 (2.5)
75	202.9 (1.8)	214.4 (3.8)	222.6 (1.5)	224.1 (1.7)
90	229.2 (2.9)	236.4 (4.7)	246.4 (3.7)	246.8 (2.4)
95	244.1 (2.9)	246.5 (3.3)	259.5 (3.5)	260.0 (5.4)
HISPANIC STUDENTS				
MEAN	191.9 (2.7)	189.0 (4.2)	199.4 (3.1)	206.2 (2.2)
ST. DEV.	41.2 (1.4)	36.6 (2.3)	38.9 (1.6)	37.0 (1.7)
PERCENTILES				
5	125.2 (7.0)	127.3 (9.6)	134.1 (10.1)	146.2 (5.5)
10	139.8 (3.3)	141.9 (16.8)	148.1 (5.2)	158.6 (4.3)
25	163.9 (4.3)	161.9 (7.4)	172.6 (3.4)	180.6 (3.7)
50	191.4 (3.6)	190.8 (4.8)	199.8 (6.7)	206.2 (3.7)
75	219.0 (3.2)	215.9 (3.4)	225.6 (4.1)	232.7 (4.1)
90	245.7 (4.9)	236.2 (5.6)	252.1 (5.4)	252.9 (4.4)
95	261.3 (6.4)	246.0 (7.6)	264.9 (6.7)	266.8 (6.9)

NAEP 1990 SCIENCE TREND ASSESSMENT—AGE 13

Mean Proficiencies, Standard Deviations, and Percentiles

	1977	1982	1986	1990
TOTAL SAMPLE				
MEAN	247.4 (1.1)	250.1 (1.3)	251.4 (1.4)	255.2 (0.9)
ST. DEV.	43.5 (0.4)	38.6 (0.5)	36.6 (0.6)	37.6 (0.7)
PERCENTILES				
5	173.7 (1.7)	185.2 (2.2)	188.9 (2.2)	191.4 (2.0)
10	190.6 (1.4)	199.6 (1.8)	203.3 (2.0)	205.9 (1.7)
25	218.4 (1.4)	224.1 (1.1)	227.2 (1.3)	230.0 (1.5)
50	248.6 (1.2)	250.9 (1.3)	252.1 (1.8)	256.4 (1.2)
75	277.5 (0.9)	276.7 (1.5)	276.5 (1.5)	281.1 (0.9)
90	302.4 (0.9)	299.2 (1.6)	298.2 (2.0)	302.4 (1.1)
95	316.9 (1.5)	312.8 (1.3)	310.3 (1.6)	315.1 (1.9)
MALE STUDENTS				
MEAN	251.1 (1.3)	255.6 (1.5)	256.1 (1.6)	258.5 (1.1)
ST. DEV.	43.9 (0.5)	38.7 (0.6)	37.4 (1.0)	38.8 (0.8)
PERCENTILES				
5	176.7 (1.9)	190.2 (2.6)	192.3 (4.2)	191.9 (2.5)
10	193.5 (1.6)	204.4 (1.6)	207.2 (2.5)	207.3 (3.4)
25	221.5 (1.7)	229.5 (1.7)	231.1 (1.6)	232.9 (1.4)
50	252.4 (1.5)	256.7 (1.5)	256.9 (2.0)	260.3 (1.4)
75	281.6 (1.2)	282.6 (1.5)	282.4 (1.4)	285.8 (2.2)
90	306.5 (1.3)	305.0 (1.7)	303.4 (1.6)	307.4 (1.5)
95	321.2 (1.5)	318.3 (2.3)	316.2 (2.2)	320.2 (1.2)
FEMALE STUDENTS				
MEAN	243.7 (1.2)	245.0 (1.3)	246.9 (1.5)	251.8 (1.1)
ST. DEV.	42.8 (0.5)	37.9 (0.7)	35.3 (0.6)	36.1 (0.8)
PERCENTILES				
5	170.8 (1.6)	180.2 (1.9)	186.3 (2.2)	190.6 (2.1)
10	187.7 (1.8)	195.5 (2.3)	200.5 (2.9)	204.8 (1.5)
25	215.5 (1.7)	219.7 (1.4)	223.4 (1.5)	227.8 (1.6)
50	245.0 (1.2)	246.1 (1.7)	248.0 (1.7)	253.1 (1.2)
75	273.0 (1.5)	271.0 (1.9)	271.0 (1.8)	276.8 (1.6)
90	297.7 (1.0)	292.8 (1.5)	291.3 (1.7)	296.8 (1.1)
95	312.1 (2.2)	305.3 (1.8)	304.0 (3.6)	308.6 (1.4)
WHITE STUDENTS				
MEAN	256.1 (0.8)	257.3 (1.1)	259.2 (1.4)	264.1 (0.9)
ST. DEV.	39.5 (0.3)	35.7 (0.6)	33.6 (0.8)	33.8 (0.5)
PERCENTILES				
5	190.8 (0.9)	198.0 (1.7)	203.5 (2.7)	208.6 (1.6)
10	205.2 (1.2)	210.8 (1.7)	215.8 (1.5)	220.4 (1.2)
25	229.3 (1.3)	233.2 (1.2)	237.0 (1.9)	241.3 (0.9)
50	256.3 (0.8)	257.6 (1.3)	259.2 (2.0)	264.5 (1.1)
75	282.9 (0.7)	281.5 (1.1)	282.3 (1.9)	287.0 (1.7)
90	306.6 (0.9)	302.7 (1.6)	302.2 (1.9)	307.1 (1.4)
95	320.8 (1.1)	316.2 (1.7)	313.9 (2.1)	319.4 (1.3)
BLACK STUDENTS				
MEAN	208.1 (2.4)	217.1 (1.3)	221.6 (2.5)	225.7 (3.1)
ST. DEV.	39.7 (0.9)	34.6 (1.2)	33.0 (0.9)	34.3 (1.7)
PERCENTILES				
5	144.3 (3.2)	160.3 (3.1)	167.8 (1.7)	169.7 (5.5)
10	157.7 (2.4)	173.0 (3.1)	180.1 (2.2)	181.8 (6.1)
25	180.5 (2.2)	193.7 (2.4)	198.3 (3.0)	202.3 (3.7)
50	207.4 (2.5)	216.8 (1.3)	221.2 (2.8)	225.7 (3.0)
75	234.8 (2.6)	240.7 (2.2)	243.5 (3.6)	249.1 (2.6)
90	259.5 (3.4)	262.2 (3.5)	264.4 (4.9)	269.0 (4.2)
95	274.6 (2.7)	274.7 (1.9)	276.8 (2.5)	283.2 (3.7)
HISPANIC STUDENTS				
MEAN	213.4 (1.9)	225.5 (3.9)	226.1 (3.1)	231.6 (2.6)
ST. DEV.	40.4 (1.2)	36.2 (1.1)	34.2 (1.2)	36.6 (1.0)
PERCENTILES				
5	147.1 (3.5)	166.3 (4.9)	171.1 (5.6)	173.7 (4.7)
10	161.4 (3.0)	179.4 (4.1)	181.3 (4.5)	185.3 (4.5)
25	185.8 (3.5)	200.7 (3.6)	201.6 (5.5)	205.9 (4.1)
50	213.3 (2.5)	225.9 (4.4)	225.6 (3.8)	230.9 (3.3)
75	240.3 (3.5)	249.3 (5.1)	249.8 (3.4)	256.4 (5.1)
90	265.8 (2.0)	271.2 (5.1)	269.9 (3.5)	280.0 (5.9)
95	282.1 (4.4)	284.8 (6.1)	283.0 (3.8)	294.2 (2.9)

NAEP 1990 SCIENCE TREND ASSESSMENT—AGE 17

Mean Proficiencies, Standard Deviations, and Percentiles

	1977	1982	1986	1990
TOTAL SAMPLE				
MEAN	289.5 (1.0)	283.3 (1.2)	288.5 (1.4)	290.4 (1.1)
ST. DEV.	45.0 (0.4)	46.7 (0.7)	44.4 (1.0)	46.2 (0.6)
PERCENTILES				
5	212.6 (1.3)	203.2 (2.2)	211.8 (2.4)	209.9 (2.3)
10	231.3 (1.4)	221.5 (1.9)	229.5 (2.4)	228.8 (2.0)
25	260.6 (1.4)	252.5 (2.1)	259.6 (1.9)	260.3 (1.9)
50	290.8 (1.0)	285.4 (1.0)	290.1 (1.9)	292.2 (1.3)
75	320.1 (0.9)	315.3 (1.6)	319.4 (1.3)	322.7 (1.4)
90	346.2 (1.1)	341.5 (1.1)	344.5 (1.9)	348.3 (1.2)
95	361.5 (1.3)	357.3 (1.4)	359.9 (2.0)	362.9 (1.5)
MALE STUDENTS				
MEAN	297.0 (1.2)	291.9 (1.4)	294.9 (1.9)	295.6 (1.3)
ST. DEV.	45.3 (0.6)	47.1 (0.9)	46.6 (1.2)	48.7 (0.9)
PERCENTILES				
5	219.5 (2.1)	210.3 (2.3)	213.9 (2.8)	210.4 (3.9)
10	238.2 (1.6)	228.9 (2.7)	231.4 (5.0)	229.5 (2.9)
25	267.6 (1.5)	261.1 (1.9)	263.5 (3.0)	263.4 (1.3)
50	298.5 (1.2)	294.3 (1.4)	298.7 (2.8)	297.9 (1.9)
75	328.1 (1.4)	324.8 (2.0)	327.6 (1.6)	329.9 (1.8)
90	353.9 (1.4)	350.6 (1.9)	353.4 (2.8)	356.7 (2.3)
95	368.8 (1.6)	365.3 (1.3)	367.0 (4.6)	372.5 (1.8)
FEMALE STUDENTS				
MEAN	282.2 (1.1)	275.2 (1.3)	282.3 (1.5)	285.4 (1.6)
ST. DEV.	43.5 (0.5)	44.8 (0.8)	41.3 (1.1)	43.2 (1.0)
PERCENTILES				
5	207.5 (1.6)	198.3 (3.6)	209.8 (3.5)	209.2 (3.7)
10	226.1 (2.1)	215.5 (2.6)	228.1 (2.0)	228.2 (4.5)
25	254.5 (1.5)	245.7 (2.1)	256.2 (2.0)	257.7 (2.4)
50	283.8 (1.2)	277.6 (2.0)	283.7 (1.4)	287.7 (2.0)
75	311.5 (1.1)	306.2 (1.2)	310.8 (1.8)	316.2 (2.3)
90	336.3 (1.2)	330.1 (1.0)	333.5 (3.0)	339.6 (2.3)
95	351.2 (1.5)	345.2 (1.5)	348.3 (3.2)	351.5 (1.6)
WHITE STUDENTS				
MEAN	297.7 (0.7)	293.1 (1.0)	297.5 (1.7)	300.9 (1.1)
ST. DEV.	40.5 (0.3)	41.6 (0.5)	40.6 (1.0)	41.1 (0.6)
PERCENTILES				
5	231.1 (0.9)	223.0 (1.7)	228.3 (2.9)	232.8 (2.3)
10	246.0 (0.7)	239.1 (1.5)	244.5 (3.1)	243.0 (2.0)
25	270.3 (0.8)	265.5 (1.5)	271.0 (2.0)	273.4 (1.5)
50	297.5 (0.7)	293.6 (1.0)	298.7 (1.7)	301.2 (1.2)
75	325.0 (0.9)	321.2 (1.6)	324.9 (1.3)	329.0 (1.6)
90	349.9 (1.0)	346.0 (1.3)	348.9 (3.0)	352.3 (1.3)
95	364.6 (1.4)	360.8 (1.3)	363.5 (2.8)	367.3 (2.0)
BLACK STUDENTS				
MEAN	240.2 (1.5)	234.7 (1.7)	252.8 (2.9)	253.0 (4.5)
ST. DEV.	41.6 (0.9)	41.8 (1.3)	40.4 (2.2)	44.7 (2.4)
PERCENTILES				
5	172.4 (1.5)	166.0 (3.1)	189.3 (4.8)	182.0 (10.1)
10	187.3 (1.9)	180.6 (3.5)	201.6 (4.9)	196.6 (3.1)
25	212.1 (1.4)	206.4 (3.2)	225.0 (4.2)	220.5 (4.3)
50	240.4 (1.8)	234.7 (3.0)	251.9 (5.9)	251.6 (3.0)
75	267.9 (2.0)	262.7 (2.2)	279.5 (3.4)	282.9 (6.0)
90	293.4 (2.6)	288.8 (3.9)	306.0 (4.2)	313.6 (11.3)
95	309.6 (2.6)	305.4 (1.6)	322.8 (5.8)	329.3 (10.2)
HISPANIC STUDENTS				
MEAN	262.3 (2.2)	248.7 (2.3)	259.3 (3.8)	261.5 (4.4)
ST. DEV.	41.8 (1.5)	43.4 (2.3)	39.3 (1.7)	44.1 (2.6)
PERCENTILES				
5	193.7 (5.2)	178.0 (6.1)	194.4 (9.3)	188.7 (6.2)
10	208.4 (4.0)	194.2 (7.2)	209.2 (3.8)	203.9 (11.1)
25	234.3 (3.9)	218.8 (3.3)	232.0 (5.6)	230.6 (3.6)
50	262.4 (2.4)	248.0 (2.5)	258.9 (5.8)	260.5 (5.7)
75	289.5 (5.1)	278.4 (3.4)	285.8 (3.6)	292.6 (10.6)
90	316.9 (4.4)	302.1 (3.4)	309.9 (7.6)	317.4 (5.1)
95	331.3 (4.4)	320.8 (11.0)	324.4 (6.3)	329.5 (9.1)

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NAEP 1990 SCIENCE TREND ASSESSMENT—AGE 9

Percentage of Students Responding Correctly to Science Trend Items

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
ANIMALS COMMUNICATE	1990	83.4(1.1)	83.7(1.5)	83.2(1.5)	87.9(1.1)	67.4(3.4)	73.3(4.5)
	1986	77.8(1.7)	78.7(1.7)	76.9(2.1)	81.8(1.9)	61.4(3.1)	66.5(3.7)
	1977	73.5(1.4)	74.2(1.7)	72.8(1.8)	78.0(1.5)	49.3(2.8)	68.4(4.7)
WATER EVAPORATION: PUT IN SUN	1990	45.6(1.2)	48.6(1.6)	42.7(1.9)	46.3(1.3)	40.3(3.5)	45.6(4.9)
	1986	42.4(1.4)	44.6(1.7)	40.4(2.2)	43.6(1.7)	37.0(3.0)	40.5(6.7)
	1977	53.7(1.5)	54.3(1.7)	53.1(2.1)	56.3(1.7)	40.7(2.5)	48.0(3.9)
WATER EVAPORATION: COVER JAR	1990	43.3(1.2)	45.2(1.8)	41.4(2.1)	44.9(1.3)	38.6(2.6)	33.5(4.1)
	1986	40.7(1.4)	42.0(2.0)	39.4(1.7)	41.9(1.7)	36.6(3.3)	34.5(4.8)
	1977	49.9(1.4)	52.3(1.8)	47.6([illegible].5)	51.7(1.5)	41.1(2.5)	48.8(3.6)
FINDING CAUSE OF A SORE THROAT	1990	70.8(1.3)	66.1(2.0)	75.3(1.5)	73.4(1.4)	63.6(4.2)	66.4(3.6)
	1986	69.0(1.4)	64.3(1.9)	73.4(1.9)	71.9(1.4)	58.5(2.4)	59.6(6.6)
	1982	64.1(1.3)	61.2(1.6)	67.1(2.0)	66.2(1.6)	59.0(2.7)	50.0(3.1)
	1977	53.9(1.3)	52.6(2.1)	55.2(1.8)	55.1(1.5)	47.1(2.2)	53.6(3.2)
PREDATOR-PREY: DEER/MT. LIONS	1990	69.4(1.1)	70.2(1.6)	68.8(1.6)	73.2(1.1)	54.6(2.8)	61.5(4.1)
	1986	62.3(1.4)	62.3(2.1)	62.4(2.3)	66.4(1.8)	47.9(2.8)	47.5(4.2)
	1977	65.4(1.6)	66.5(2.1)	64.3(2.1)	69.4(1.3)	42.5(5.2)	63.1(6.5)
SEE A DOCTOR? HURT ARM	1990	88.1(1.0)	86.0(1.4)	90.0(1.3)	91.5(1.1)	75.7(3.1)	80.2(3.4)
	1986	86.7(1.1)	85.1(1.3)	88.2(1.3)	89.9(1.2)	75.9(2.8)	76.3(3.4)
	1977	90.9(0.8)	89.2(1.0)	92.7(1.0)	92.3(0.7)	86.5(2.2)	81.2(3.3)
SEE A DOCTOR? EXERCISE	1990	82.7(1.2)	80.0(1.7)	85.3(1.3)	87.2(1.2)	65.2(3.1)	74.6(5.6)
	1986	79.6(1.2)	78.6(1.5)	80.6(1.4)	85.2(1.3)	55.5(2.6)	68.9(6.2)
	1977	76.0(1.1)	75.1(1.6)	76.9(1.4)	80.5(1.1)	57.3(3.2)	62.5(5.0)
SEE A DOCTOR? HEADACHE	1990	89.0(0.6)	87.1(1.1)	90.7(1.1)	89.7(0.7)	87.8(1.8)	85.2(3.6)
	1986	89.1(0.8)	88.0(1.2)	90.2(0.9)	89.9(0.8)	87.1(3.1)	85.0(1.5)
	1977	90.6(0.6)	90.4(1.0)	90.7(0.9)	91.3(0.6)	86.8(1.3)	87.4(2.8)
SEE A DOCTOR? STOMACHACHE	1990	77.3(1.0)	75.5(1.6)	79.0(1.4)	82.9(1.0)	58.2(2.9)	68.0(5.3)
	1986	75.6(1.3)	74.0(1.6)	77.2(1.8)	79.6(1.6)	59.6(3.1)	63.9(5.9)
	1977	69.2(1.5)	67.8(1.8)	70.6(1.9)	73.8(1.4)	46.8(4.0)	60.2(5.1)
SEE A DOCTOR? PAIN IN SIDE	1990	80.1(1.1)	76.9(1.5)	83.2(1.4)	82.4(1.1)	72.4(4.0)	75.0(3.7)
	1986	77.5(1.3)	74.5(2.1)	80.4(1.3)	80.6(1.6)	66.7(2.8)	68.6(2.3)
	1977	80.4(1.1)	78.7(1.6)	82.0(1.4)	80.8(1.1)	78.1(2.8)	76.6(4.5)
BALLOON SHAPE AND VOLUME	1990	58.2(1.4)	58.8(1.9)	57.7(1.8)	62.3(1.5)	44.1(3.5)	40.8(5.1)
	1986	57.3(1.2)	59.4(1.9)	55.3(1.7)	60.2(1.5)	46.7(3.6)	46.3(5.9)
	1977	58.5(1.4)	58.7(2.0)	58.2(1.5)	63.7(1.3)	30.7(2.8)	49.4(4.7)
DETERMINING THE AGE OF A TREE	1990	64.0(1.9)	66.2(1.9)	62.0(2.5)	71.0(1.9)	42.2(4.8)	40.6(4.2)
	1986	55.7(1.8)	58.2(2.3)	53.3(2.0)	62.1(1.9)	34.8(3.3)	32.7(3.8)
	1977	61.6(1.9)	64.6(2.0)	58.6(2.1)	68.1(1.7)	34.1(3.0)	37.2(5.0)
GARDEN LOSES NUTRIENTS	1990	55.5(1.5)	54.7(1.9)	56.2(2.3)	63.4(1.7)	31.2(3.5)	33.1(4.3)
	1986	54.3(1.3)	56.2(1.9)	52.5(1.7)	61.3(1.4)	30.5(3.0)	27.9(3.7)
	1982	54.3(1.6)	55.1(2.2)	53.5(2.0)	59.6(1.6)	32.6(1.9)	34.0(3.3)
	1977	56.3(1.7)	57.4(1.9)	55.2(2.4)	62.9(1.5)	28.5(3.8)	31.4(3.9)
HOW TO CARE FOR A BLEEDING CUT	1990	48.2(1.4)	51.5(2.1)	45.1(1.8)	49.5(1.6)	40.9(3.5)	51.3(4.2)
	1986	39.9(1.4)	36.7(1.6)	42.9(1.8)	41.5(1.5)	35.3(3.3)	32.5(4.5)
	1982	46.2(1.8)	46.2(2.3)	46.1(2.0)	47.8(2.1)	38.7(2.3)	43.5(5.2)
	1977	34.9(1.8)	38.3(2.3)	31.3(2.0)	35.2(2.0)	31.0(4.3)	41.3(5.1)
SELECTING A BALANCED DIET	1990	55.0(1.5)	51.1(2.0)	58.6(2.0)	58.6(1.7)	42.8(3.3)	42.3(3.4)
	1986	51.3(1.4)	46.6(2.3)	55.8(1.9)	54.3(1.6)	38.9(3.2)	44.6(6.1)
	1982	51.5(1.5)	47.6(2.1)	55.5(1.9)	54.2(1.7)	38.5(3.4)	45.3(5.1)
	1977	46.2(1.5)	44.6(1.8)	47.9(2.2)	50.2(1.6)	28.4(2.9)	29.8(4.5)

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Percentage of Students Responding Correctly to Science Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
PARENTAL CARE BY MAMMALS	1990	48.3(1.5)	50.2(1.9)	46.5(1.9)	48.9(1.8)	43.3(3.0)	55.1(4.0)
	1986	43.1(1.4)	45.0(2.1)	41.2(1.7)	43.9(1.8)	38.2(3.7)	40.4(5.0)
	1977	42.9(1.4)	44.1(1.8)	41.6(2.0)	43.2(1.6)	44.0(2.8)	38.2(5.6)
PLANTS BEND TOWARD LIGHT	1990	27.5(1.3)	27.5(1.8)	27.6(1.7)	29.2(1.6)	20.3(2.7)	29.8(3.9)
	1986	25.6(1.5)	27.7(1.9)	23.7(1.9)	27.6(1.7)	17.2(2.4)	23.3(5.5)
	1977	29.8(1.3)	31.2(1.5)	28.4(1.7)	30.6(1.6)	27.9(3.1)	23.5(4.6)
LIFE CYCLE OF A BUTTERFLY	1990	49.6(1.4)	51.4(2.1)	47.9(1.9)	53.3(1.5)	36.2(2.6)	43.5(4.4)
	1986	43.5(1.4)	46.8(1.9)	40.3(1.8)	46.3(1.6)	33.3(3.2)	39.4(5.6)
	1977	30.4(1.6)	33.2(1.9)	27.6(1.7)	32.3(1.8)	21.7(2.0)	25.2(4.2)
POSITION OF FULCRUM	1990	62.8(1.2)	67.3(1.6)	58.3(1.8)	63.5(1.3)	61.2(3.0)	61.2(4.7)
	1986	65.1(1.5)	68.9(1.7)	61.5(2.2)	65.6(1.7)	61.7(2.7)	68.3(3.8)
	1977	74.3(1.0)	78.6(1.2)	70.0(1.4)	74.9(1.1)	70.5(2.2)	74.7(3.8)
USE OF A TELESCOPE	1990	83.1(1.5)	85.5(1.7)	80.6(1.8)	86.6(1.0)	72.1(4.8)	72.7(4.2)
	1986	82.2(1.4)	85.8(1.4)	78.7(1.8)	85.4(1.6)	71.5(2.1)	73.2(3.5)
	1977	70.5(1.6)	74.2(2.0)	66.8(1.9)	74.6(1.7)	46.7(3.2)	65.5(4.2)
CYCLER'S MOVEMENT: BIKE	1990	8.1(0.9)	8.9(1.1)	7.3(1.0)	8.0(1.1)	7.3(2.0)	7.3(1.5)
	1986	9.0(0.8)	10.6(1.1)	7.4(1.1)	9.4(1.1)	7.3(2.4)	9.7(2.3)
	1977	7.4(0.6)	7.2(0.7)	7.5(0.8)	6.9(0.6)	7.5(1.5)	10.7(2.4)
CYCLER'S MOVEMENT: TREE	1990	61.9(1.3)	61.3(1.9)	62.6(1.9)	61.7(1.4)	60.8(3.4)	66.4(3.5)
	1986	62.2(1.3)	63.8(2.3)	60.5(1.8)	62.6(1.6)	60.5(3.0)	61.1(3.5)
	1977	64.7(1.2)	64.5(1.7)	65.0(1.5)	64.3(1.4)	61.4(2.9)	79.9(2.7)
CYCLER'S MOVEMENT: HOUSE	1990	58.8(1.3)	58.9(2.1)	58.6(1.6)	60.5(1.7)	50.3(3.6)	62.0(3.5)
	1986	60.7(1.1)	61.9(1.7)	59.6(1.6)	62.4(1.2)	55.4(3.5)	55.6(4.1)
	1977	63.0(1.2)	63.3(1.7)	62.6(1.6)	64.0(1.3)	59.0(4.0)	53.8(3.9)
CIRCUIT: POSITIVE	1990	66.7(1.6)	73.2(1.8)	60.1(2.2)	68.8(1.7)	56.2(3.6)	66.2(3.8)
	1986	64.5(1.5)	72.8(1.9)	56.4(1.9)	65.8(1.6)	58.2(2.7)	58.8(1.9)
	1977	66.2(1.3)	71.8(2.2)	60.6(1.6)	69.8(1.2)	50.5(2.7)	58.3(7.3)
CIRCUIT: POSITIVE/NEGATIVE	1990	76.3(1.4)	80.6(1.8)	71.9(1.9)	77.7(1.6)	67.5(3.3)	77.1(3.1)
	1986	76.3(1.2)	80.1(1.5)	72.7(2.0)	77.6(1.2)	72.0(2.1)	69.7(3.4)
	1977	75.5(1.3)	78.5(1.8)	72.6(1.6)	77.8(1.4)	61.5(3.1)	76.2(5.3)
CIRCUIT: POSITIVE/POSITIVE	1990	67.1(1.5)	72.4(1.8)	61.8(1.8)	68.1(1.8)	61.4(2.6)	69.1(4.5)
	1986	67.9(1.3)	72.4(1.9)	63.6(1.9)	69.3(1.6)	61.1(3.0)	63.7(4.1)
	1977	63.3(1.4)	66.5(2.1)	60.2(1.8)	64.2(1.6)	59.0(3.0)	59.1(6.4)
CIRCUIT: CROSED	1990	50.7(1.7)	56.8(2.0)	44.6(2.2)	52.5(1.9)	42.7(3.6)	47.5(2.9)
	1986	51.0(1.0)	59.6(1.3)	42.7(1.5)	51.2(1.4)	50.2(3.2)	51.6(4.2)
	1977	56.7(1.3)	64.5(1.9)	49.0(1.5)	58.1(1.3)	47.3(2.9)	54.6(5.4)
BALLOON: VOLUME & TEMPERATURE	1990	41.7(1.5)	44.8(2.2)	38.5(1.9)	44.1(1.7)	27.5(3.0)	42.9(4.4)
	1986	40.4(1.4)	47.6(1.9)	33.4(1.9)	41.9(1.7)	35.5(1.8)	34.2(4.9)
	1977	52.3(1.5)	55.0(2.0)	49.7(2.0)	55.4(1.7)	39.7(3.8)	44.3(4.5)
ELECTRICAL CONDUCTOR: RUBBER	1990	78.8(1.5)	79.8(1.9)	77.7(1.9)	81.3(1.6)	66.6(3.7)	72.2(5.5)
	1986	80.1(1.2)	81.5(1.3)	78.7(1.7)	83.3(1.4)	69.0(2.7)	70.0(3.0)
	1977	78.4(1.0)	79.7(1.1)	77.1(1.6)	81.8(1.0)	61.4(2.3)	68.8(4.2)
ELECTRICAL CONDUCTOR: COPPER	1990	81.8(1.1)	84.7(1.3)	78.9(1.5)	83.9(1.2)	71.8(4.0)	77.1(2.9)
	1986	83.7(1.1)	84.8(1.5)	82.6(1.3)	85.6(1.2)	78.7(2.8)	73.6(3.5)
	1977	80.7(1.0)	83.0(1.2)	78.3(1.5)	83.8(1.2)	66.3(2.9)	68.0(3.3)
ELECTRICAL CONDUCTOR: FOIL	1990	38.1(1.7)	38.7(2.1)	37.5(2.2)	38.3(2.0)	33.7(3.4)	45.5(3.2)
	1986	37.0(1.6)	37.9(1.9)	36.0(2.0)	38.1(2.0)	32.7(3.1)	31.1(5.2)
	1977	36.0(1.4)	38.7(1.7)	33.3(1.8)	35.9(1.7)	38.7(2.5)	31.5(4.9)

NAEP 1990 SCIENCE TREND ASSESSMENT—AGE 9

Percentage of Students Responding Correctly to Science Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
ELECTRICAL CONDUCTOR: PENNY	1990	31.4(1.4)	32.5(1.9)	30.3(1.9)	33.7(1.7)	22.7(2.9)	31.3(4.0)
	1986	28.9(1.0)	30.8(1.5)	27.0(1.3)	31.2(1.1)	19.7(1.8)	22.2(4.6)
	1977	35.8(1.3)	38.8(1.6)	32.8(1.8)	36.0(1.4)	35.2(4.6)	30.8(4.1)
ELECTRICAL CONDUCTOR: CORK	1990	65.7(1.5)	72.2(1.7)	59.2(1.9)	72.1(1.5)	43.7(2.5)	48.2(4.6)
	1986	69.8(1.6)	75.4(2.0)	64.4(1.8)	74.2(1.7)	54.0(2.8)	56.6(4.3)
	1977	72.5(1.1)	77.5(1.6)	67.6(1.4)	77.8(1.1)	50.5(3.0)	56.5(4.9)
SUN IS A STAR	1990	64.3(1.7)	66.6(1.9)	62.0(2.1)	69.2(1.8)	41.3(3.6)	56.8(4.0)
	1986	61.6(1.7)	66.9(2.0)	56.5(2.2)	65.1(1.7)	47.5(4.3)	55.8(4.3)
	1982	52.3(1.7)	57.3(1.8)	47.3(2.5)	56.9(2.2)	33.5(3.3)	36.6(5.5)
	1977	50.2(2.0)	53.2(2.4)	47.2(2.4)	53.8(2.2)	33.8(2.5)	34.3(7.7)
OBJECTS THAT CONDUCT HEAT	1990	55.8(1.9)	57.0(2.5)	54.5(2.0)	58.0(2.2)	45.3(2.9)	54.2(3.6)
	1986	59.2(1.4)	60.5(1.9)	58.1(1.8)	62.7(1.6)	48.4(3.3)	46.8(4.7)
	1977	46.7(1.5)	48.4(2.0)	44.9(2.2)	49.8(1.5)	35.2(2.9)	31.9(4.1)
PLANTING TO AVOID EROSION	1990	36.4(1.9)	36.8(2.1)	36.0(2.8)	36.5(2.4)	31.5(3.5)	39.3(4.6)
	1986	36.6(1.7)	38.2(2.1)	35.0(2.1)	36.2(1.9)	35.4(2.9)	41.4(4.4)
	1982	38.0(1.2)	36.9(1.8)	39.3(1.9)	38.4(1.4)	37.4(2.9)	35.4(3.7)
	1977	40.0(1.4)	38.8(1.8)	41.1(1.9)	41.2(1.5)	35.3(2.3)	32.3(4.9)
LENGTH OF SHADOWS AT NOON	1990	28.3(1.5)	32.2(2.0)	24.3(1.6)	30.6(1.7)	18.8(3.5)	27.5(2.8)
	1986	29.9(1.6)	35.8(2.5)	24.3(1.5)	32.0(1.8)	21.5(2.7)	28.7(5.6)
	1977	29.7(1.5)	34.1(1.9)	25.3(1.7)	31.5(1.7)	22.0(2.3)	19.8(2.5)
DETECT MAGNET THROUGH WATER	1990	49.3(1.3)	46.4(2.0)	52.3(1.5)	48.1(1.7)	54.7(2.3)	52.1(3.6)
	1986	49.1(1.5)	46.1(2.0)	51.9(2.1)	47.4(1.5)	56.1(3.8)	51.3(3.6)
	1977	51.3(1.3)	53.8(1.5)	48.9(2.1)	48.7(1.5)	62.7(2.8)	61.1(5.6)
DETECT MAGNET THROUGH PAPER	1990	78.7(1.3)	84.2(1.6)	73.1(1.8)	79.0(1.4)	76.4(3.0)	83.2(3.9)
	1986	76.1(1.2)	82.8(1.6)	69.7(1.3)	76.9(1.4)	67.1(2.5)	88.3(3.3)
	1977	82.2(0.9)	88.1(1.0)	76.3(1.6)	83.3(1.0)	77.6(2.4)	76.7(4.4)
DETECT MAGNET THROUGH GLASS	1990	52.1(1.5)	52.8(2.3)	51.3(1.5)	51.1(1.5)	54.3(4.8)	56.8(3.2)
	1986	45.9(1.6)	44.7(2.1)	47.1(2.0)	44.1(2.1)	54.1(2.0)	50.7(4.5)
	1977	38.4(1.0)	41.4(1.6)	35.4(1.4)	35.9(1.2)	52.7(1.9)	39.3(4.1)
SEPARATING SALT, SAND, & WATER	1990	34.4(1.5)	33.7(1.6)	35.2(2.3)	36.7(1.6)	20.6(3.2)	32.3(4.6)
	1986	33.8(1.3)	36.6(2.1)	31.2(1.5)	36.4(1.6)	23.4(2.5)	26.1(3.3)
	1977	29.7(1.0)	31.5(1.5)	27.9(1.5)	32.4(1.2)	19.7(1.7)	17.3(3.1)
ACCELERATION OF A MARBLE	1990	23.8(1.2)	33.0(1.8)	14.4(1.6)	26.1(1.5)	15.6(2.1)	15.8(2.6)
	1986	21.3(1.2)	29.5(1.5)	13.3(1.6)	22.0(1.3)	18.3(2.6)	19.9(4.9)
	1977	25.6(1.1)	34.2(1.6)	17.0(1.3)	26.3(1.3)	23.1(2.5)	22.9(3.8)
USING A BALANCE	1990	20.7(1.1)	17.9(1.4)	23.6(1.7)	20.3(1.2)	21.0(2.9)	22.0(2.8)
	1986	20.7(0.9)	20.6(1.3)	20.9(1.2)	20.5(1.1)	21.6(2.5)	22.3(3.1)
	1977	17.4(1.0)	13.8(1.3)	21.1(1.4)	17.7(1.1)	17.5(2.4)	13.1(2.8)
READING A HISTOGRAM	1990	98.8(0.2)	98.9(0.4)	98.8(0.3)	98.9(0.2)	98.3(0.8)	99.0(0.6)
	1986	97.6(0.4)	97.6(0.5)	97.6(0.6)	97.9(0.4)	97.8(0.9)	94.9(3.5)
	1977	92.4(1.0)	92.8(0.9)	92.0(1.3)	93.7(1.0)	83.8(1.8)	93.2(2.0)
USING A GRID TO LOCATE OBJECTS	1990	97.8(0.4)	97.5(0.6)	98.1(0.4)	98.2(0.4)	96.4(1.4)	95.6(1.5)
	1986	96.3(0.5)	96.2(0.6)	96.4(0.7)	97.0(0.5)	95.6(1.0)	91.2(3.4)
	1977	90.6(1.1)	91.1(1.2)	90.1(1.5)	94.0(0.6)	74.9(4.5)	80.4(4.3)
WATER LEVEL IN U-TUBE	1990	88.3(0.8)	87.9(1.3)	88.6(1.0)	91.7(0.7)	75.8(2.5)	81.0(2.9)
	1986	90.3(0.9)	92.0(0.9)	88.4(1.4)	91.8(1.0)	83.2(1.8)	87.3(3.5)
	1977	87.8(1.1)	90.1(1.2)	85.3(1.5)	90.8(0.9)	71.0(4.0)	85.8(2.7)

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Percentage of Students Responding Correctly to Science Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
WATER LEVEL IN UNEQUAL U-TUBE	1990	73.9(1.1)	75.7(1.1)	72.0(1.7)	77.1(1.0)	62.6(3.9)	69.4(2.8)
	1986	74.9(1.4)	77.7(1.5)	71.8(1.6)	77.9(1.5)	59.5(2.8)	73.4(3.4)
	1977	72.6(1.5)	75.1(1.6)	69.9(2.1)	76.9(1.4)	49.5(3.1)	66.2(4.3)
FLOATING AND SINKING BLOCKS	1990	77.6(1.2)	77.9(1.8)	77.3(1.4)	82.7(1.1)	60.5(3.8)	61.6(4.1)
	1986	76.8(1.2)	79.5(1.5)	73.8(1.7)	80.8(1.4)	61.0(2.7)	64.9(5.9)
	1977	68.8(1.6)	68.9(1.8)	68.8(2.2)	73.2(1.5)	47.6(4.4)	58.0(4.5)
BALANCING A SEESAW	1990	65.3(1.4)	66.0(1.8)	64.6(1.8)	68.7(1.7)	53.3(3.8)	50.6(4.1)
	1986	58.9(1.3)	59.3(1.7)	58.4(1.9)	61.1(1.3)	48.5(3.4)	59.0(6.2)
	1977	58.5(1.5)	60.7(1.7)	56.0(2.0)	60.5(1.5)	46.5(3.4)	56.0(4.7)
DOG EXPERIMENT: ANY DOG LEARNS	1990	66.1(1.5)	64.0(1.7)	68.2(1.9)	70.4(1.4)	51.6(4.4)	50.7(3.9)
	1986	61.0(1.4)	58.4(1.5)	63.9(2.3)	65.3(1.7)	45.9(3.2)	49.4(3.8)
	1977	62.9(1.5)	62.2(1.7)	63.5(2.0)	67.0(1.5)	43.3(3.5)	52.3(5.1)
DOG EXPERIMENT: SOME DOGS LEAR	1990	90.4(0.9)	89.4(1.2)	91.3(1.1)	93.9(0.6)	79.4(2.8)	80.8(4.5)
	1986	89.0(1.0)	90.0(0.9)	87.9(1.5)	92.0(0.9)	82.2(2.5)	73.7(3.7)
	1977	89.7(1.0)	89.5(1.2)	89.9(1.1)	92.8(0.6)	79.2(2.5)	72.1(5.3)
DOG EXPERIMENT: TEACH ANY DOG	1990	63.1(1.5)	64.4(1.8)	61.7(1.8)	65.8(1.4)	59.3(3.8)	48.8(4.6)
	1986	62.9(1.5)	65.5(1.8)	60.1(2.4)	65.2(1.5)	59.3(3.5)	49.2(3.9)
	1977	60.5(1.6)	63.8(2.1)	57.4(2.0)	62.1(1.5)	54.4(3.0)	51.1(4.8)
RELATING SPEED OF CAR/TRAIN	1990	48.4(1.5)	53.1(2.1)	43.8(2.2)	54.5(1.5)	26.7(2.0)	29.9(4.4)
	1986	49.4(1.3)	57.2(2.0)	40.9(1.5)	53.5(1.5)	32.3(2.5)	38.7(4.0)
	1977	50.7(1.9)	55.1(2.4)	46.1(1.9)	54.5(1.9)	29.8(2.9)	41.1(6.5)
CLASSIFYING OBJECTS: SHAPE	1990	74.5(1.2)	71.7(1.6)	77.3(1.5)	78.2(1.4)	61.8(2.7)	64.8(3.1)
	1986	71.8(1.3)	69.8(1.6)	74.0(1.5)	75.5(1.5)	60.0(3.1)	57.1(2.6)
	1982	74.5(1.4)	71.8(2.0)	77.4(1.8)	76.7(1.6)	65.0(3.5)	65.9(4.6)
	1977	70.2(1.2)	70.1(1.6)	70.4(1.4)	73.6(1.4)	56.8(2.4)	55.3(3.7)
CLASSIFYING OBJECTS: COLOR	1990	81.1(1.1)	79.9(1.3)	82.2(1.4)	83.0(1.4)	74.6(2.8)	73.4(3.9)
	1986	77.6(1.4)	76.6(1.5)	78.7(1.7)	80.2(1.3)	71.1(3.2)	62.7(7.8)
	1982	74.8(1.5)	71.7(2.1)	78.0(1.5)	77.5(1.6)	64.8(2.3)	62.9(4.5)
	1977	71.6(1.3)	71.7(1.5)	71.5(1.7)	74.6(1.2)	60.3(3.1)	57.6(5.7)
CLASSIFYING OBJECTS: SIZE	1990	75.6(1.2)	73.1(1.8)	78.2(1.5)	79.4(1.4)	63.7(2.8)	61.2(4.2)
	1986	71.1(1.2)	70.3(1.5)	71.9(1.7)	74.9(1.3)	59.4(3.5)	53.7(3.6)
	1982	69.0(1.5)	66.4(1.9)	71.6(2.6)	71.9(1.7)	55.9(2.1)	59.1(4.1)
	1977	66.8(1.3)	66.9(1.7)	66.8(1.7)	70.6(1.4)	53.7(2.5)	47.7(4.4)
MAGNETISM: COPPER	1990	51.0(1.3)	60.8(1.9)	41.5(2.0)	52.6(1.6)	46.1(3.8)	38.6(5.0)
	1986	54.8(1.5)	60.6(1.9)	48.4(2.1)	57.0(1.8)	44.2(3.8)	52.2(3.7)
	1977	46.5(1.6)	55.4(2.0)	37.7(2.0)	48.6(1.9)	37.2(2.8)	40.2(4.7)
MAGNETISM: COMPASS	1990	33.6(1.1)	40.8(1.8)	26.5(1.5)	33.9(1.2)	30.7(2.9)	29.4(2.5)
	1986	35.1(1.6)	40.6(2.2)	29.1(2.0)	35.8(2.0)	30.8(3.1)	36.0(3.4)
	1977	38.8(1.4)	49.1(1.9)	28.7(1.6)	40.0(1.5)	36.1(3.8)	29.6(4.3)
MAGNETISM: IRON	1990	78.0(1.5)	80.0(1.5)	76.0(1.8)	80.6(1.2)	70.1(5.0)	60.5(4.1)
	1986	78.4(0.9)	80.7(1.3)	75.8(1.1)	79.8(1.0)	78.1(2.2)	63.7(3.9)
	1977	73.6(1.1)	77.1(1.6)	70.1(1.5)	74.2(1.2)	71.3(3.0)	70.2(4.2)
MAGNETISM: FOIL	1990	69.7(1.2)	71.1(1.6)	68.3(1.9)	73.5(1.2)	55.7(3.1)	57.4(3.7)
	1986	71.6(1.2)	73.2(1.6)	69.8(1.6)	74.1(1.4)	63.7(2.6)	60.7(7.0)
	1977	67.1(1.3)	68.7(1.7)	65.6(1.7)	70.5(1.3)	54.1(2.7)	58.6(3.6)
INTERPRET TABLE OF BOOKS READ	1990	63.6(1.4)	62.3(1.9)	64.8(2.0)	68.8(1.3)	47.7(3.2)	41.4(3.6)
	1986	61.3(1.5)	59.2(1.9)	63.6(2.1)	66.5(1.7)	44.1(3.2)	42.3(5.1)
	1982	57.1(1.6)	54.2(1.8)	60.0(2.1)	62.3(2.0)	36.3(2.2)	27.5(4.5)
	1977	60.2(1.9)	58.9(2.1)	61.5(2.3)	65.9(1.7)	35.3(4.0)	33.9(3.8)

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Percentage of Students Responding Correctly to Science Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
SURVEY HEIGHT OF BOYS/GIRLS	1990	52.0(1.6)	54.5(1.9)	49.5(2.1)	52.8(1.4)	49.9(4.8)	47.2(4.1)
	1986	51.3(1.3)	52.8(1.8)	49.7(2.6)	52.7(1.5)	48.6(4.2)	42.0(6.1)
	1982	51.7(1.6)	54.8(2.0)	48.6(2.6)	53.0(1.9)	48.5(4.2)	44.2(3.0)
	1977	47.0(1.5)	48.8(1.8)	45.2(1.9)	48.6(1.7)	38.1(2.3)	44.7(2.7)
ADD HEAT TO DISSOLVE SUGAR	1990	39.7(1.3)	38.9(1.5)	40.6(2.1)	43.5(1.5)	26.9(2.9)	25.7(2.9)
	1986	42.7(1.3)	42.3(1.8)	43.1(1.9)	46.1(1.8)	28.7(3.2)	33.5(5.1)
	1977	38.4(1.5)	38.4(2.0)	38.4(1.6)	42.1(1.6)	20.8(3.0)	27.3(2.7)

NAEP 1990 SCIENCE TREND ASSESSMENT—AGE 13

Percentage of Students Responding Correctly to Science Trend Items

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
FINDING CAUSE OF A SORE THROAT	1990	80.8(1.1)	76.5(1.5)	84.9(1.6)	83.6(1.3)	71.8(3.7)	69.8(3.0)
	1986	78.6(1.7)	73.6(2.2)	83.6(1.5)	80.3(2.2)	71.7(2.6)	71.6(3.8)
	1982	74.7(2.0)	71.9(2.6)	77.3(2.1)	76.0(2.1)	70.2(4.0)	65.6(4.4)
	1977	75.0(1.3)	73.0(1.8)	77.1(1.5)	76.1(1.4)	73.2(2.2)	65.2(5.1)
PLANTS BEND TOWARD LIGHT	1990	61.0(1.4)	62.5(1.4)	59.5(2.0)	66.6(1.5)	41.0(4.0)	47.2(3.7)
	1986	54.5(2.9)	55.5(2.0)	53.6(4.3)	58.7(3.3)	38.7(3.5)	42.9(4.9)
	1982	55.4(1.7)	56.8(1.9)	54.1(2.3)	60.0(1.9)	36.1(3.5)	38.0(5.2)
	1977	53.3(1.8)	54.8(2.1)	51.7(2.3)	58.1(2.0)	29.3(2.6)	39.7(4.6)
DOG RELATED TO WOLF	1990	94.4(0.6)	96.2(0.6)	92.7(1.0)	96.1(0.6)	88.1(1.9)	91.8(2.4)
	1986	95.7(0.6)	96.6(0.6)	94.8(0.9)	97.3(0.7)	89.8(1.4)	91.7(1.9)
	1977	94.0(0.7)	94.8(0.7)	93.1(0.9)	95.7(0.6)	85.9(2.4)	88.7(2.0)
OBSERVING A SEALED AQUARIUM	1990	64.9(1.3)	67.5(1.6)	62.3(1.5)	67.9(1.4)	55.7(3.2)	50.8(3.5)
	1986	62.8(1.7)	64.9(2.1)	60.7(2.1)	63.1(2.0)	60.9(3.9)	62.0(2.6)
	1982	70.4(1.1)	72.7(1.3)	68.3(1.7)	71.2(1.2)	67.2(2.3)	66.5(5.6)
	1977	73.7(1.0)	72.7(1.7)	74.5(1.4)	75.2(1.1)	65.0(2.8)	69.2(3.0)
MUSEUM: HABITATS	1990	85.4(1.0)	83.1(1.6)	87.7(1.0)	86.2(1.2)	85.3(2.4)	80.3(3.2)
	1986	82.2(0.9)	81.8(1.3)	82.6(1.5)	83.7(1.1)	76.9(2.1)	73.7(5.0)
	1977	80.8(1.2)	77.0(1.5)	84.6(1.5)	84.0(0.9)	67.4(3.3)	62.2(5.8)
MUSEUM: SIMILAR ANIMALS	1990	64.3(1.5)	62.3(1.9)	66.3(1.8)	67.4(1.6)	54.7(3.1)	53.7(4.1)
	1986	59.1(1.7)	60.2(2.3)	58.1(2.7)	62.4(2.1)	45.6(2.6)	52.0(3.1)
	1977	58.8(1.9)	57.7(2.3)	59.8(2.1)	61.6(1.9)	45.0(2.6)	46.5(7.1)
SEE ATOM W/UNAIDED EYE?	1990	91.9(0.7)	92.8(0.9)	91.0(1.0)	94.9(0.8)	82.9(2.1)	81.9(3.6)
	1986	91.4(1.1)	93.1(1.3)	89.7(1.4)	94.3(1.0)	81.6(2.5)	79.6(4.3)
	1977	91.4(0.9)	92.5(1.0)	90.3(1.2)	93.3(1.0)	81.9(2.6)	90.7(2.9)
SEE ATOM W/MAGNIFYING GLASS?	1990	71.4(1.5)	76.8(1.6)	66.3(2.1)	79.6(1.3)	40.9(4.8)	56.0(5.6)
	1986	72.8(1.7)	77.7(1.4)	68.0(3.2)	79.6(1.7)	46.7(3.8)	47.8(3.8)
	1977	75.6(1.4)	78.5(1.5)	72.6(1.9)	80.9(1.4)	47.6(4.2)	60.3(5.4)
SEE ATOM W/MICROSCOPE?	1990	53.9(1.3)	58.4(1.7)	49.5(1.8)	59.4(1.3)	33.8(3.8)	42.4(3.1)
	1986	56.8(1.7)	60.8(1.8)	52.8(2.1)	61.1(1.8)	39.8(2.7)	43.5(6.0)
	1977	63.5(1.5)	67.1(2.0)	59.8(1.6)	66.4(1.8)	50.5(3.9)	53.8(7.1)
HEATING 2 PANS: HEATS FASTEST	1990	72.1(1.1)	78.4(1.5)	66.1(1.9)	77.5(1.2)	55.5(2.7)	53.0(3.8)
	1986	72.5(1.8)	75.9(1.7)	69.0(2.4)	77.1(1.8)	54.5(3.3)	54.8(5.0)
	1982	75.3(1.5)	79.1(1.6)	71.9(2.2)	79.6(1.4)	54.8(3.7)	65.9(5.2)
	1977	76.1(1.5)	79.7(1.8)	72.7(2.1)	81.8(1.4)	49.5(3.9)	53.8(4.6)
HEATING 2 PANS: HEATS MOST	1990	37.3(1.0)	35.7(1.5)	38.9(1.5)	36.9(1.2)	38.7(3.4)	40.0(3.8)
	1986	38.9(0.9)	38.8(1.8)	38.9(1.6)	37.6(1.1)	44.9(3.1)	40.9(4.6)
	1982	40.7(1.4)	37.9(2.3)	43.3(1.5)	41.5(1.5)	40.4(3.9)	33.5(2.5)
	1977	36.9(0.9)	37.1(1.4)	36.8(1.6)	37.3(1.1)	38.2(2.0)	27.5(4.8)
HEATING 2 PANS: COOLS FASTEST	1990	62.7(1.2)	57.4(2.0)	67.7(1.4)	64.1(1.3)	55.0(2.8)	62.6(2.8)
	1986	65.8(1.6)	63.5(2.3)	68.2(1.8)	66.7(2.2)	61.8(2.4)	63.4(3.0)
	1982	69.1(1.2)	64.4(1.7)	73.5(1.3)	71.4(1.4)	59.0(3.5)	62.0(3.7)
	1977	69.4(1.0)	66.7(1.6)	72.0(1.2)	70.8(1.0)	65.0(3.3)	58.5(2.6)
TISSUES AND CELLS	1990	56.8(1.5)	57.1(1.7)	56.5(2.0)	58.5(1.9)	50.3(2.6)	52.3(5.5)
	1986	56.6(1.8)	57.2(2.2)	56.1(2.2)	58.1(2.1)	51.2(2.7)	50.9(4.1)
	1982	51.1(1.8)	52.9(2.0)	49.4(2.1)	52.9(2.1)	42.5(4.4)	43.2(6.9)
	1977	52.5(1.5)	51.1(2.3)	54.0(1.6)	53.9(1.5)	42.9(3.7)	56.0(6.1)
MELTING CRUSHED ICE	1990	44.0(1.1)	47.5(1.7)	40.6(1.5)	47.5(1.4)	30.1(2.5)	38.0(4.2)
	1986	39.6(1.6)	45.0(1.7)	34.2(2.6)	43.8(1.9)	21.0(3.3)	25.2(5.5)
	1982	44.6(1.7)	51.4(2.3)	38.3(1.8)	47.5(2.0)	28.8(3.1)	37.7(4.1)
	1977	52.2(1.9)	56.8(2.1)	47.9(2.5)	56.5(1.8)	28.7(2.5)	43.7(3.3)

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NAEP 1990 SCIENCE TREND ASSESSMENT—AGE 13

Percentage of Students Responding Correctly to Science Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
FUNCTION OF RED BLOOD CELLS	1990	58.5(1.2)	63.1(1.2)	54.2(1.8)	60.2(1.5)	57.9(3.2)	47.0(4.7)
	1986	58.0(2.0)	60.8(2.7)	55.2(1.9)	58.5(2.2)	59.8(3.2)	50.4(4.2)
	1982	57.7(1.3)	59.4(1.9)	56.1(2.2)	58.8(1.7)	54.8(2.9)	46.1(3.5)
	1977	54.2(1.6)	55.5(2.0)	52.8(1.8)	55.3(1.7)	51.6(2.6)	39.1(4.7)
HOW TO RECOVER SALT FROM WATER	1990	38.1(1.2)	41.4(1.7)	34.9(1.7)	39.6(1.3)	36.7(2.3)	29.8(4.1)
	1986	37.6(1.5)	43.1(2.3)	32.0(1.8)	40.3(1.6)	29.1(3.0)	23.2(3.0)
	1977	42.1(1.6)	48.5(1.9)	36.0(2.0)	44.2(1.9)	30.5(1.9)	36.8(4.9)
WATER TEMPERATURE FOR SWIMMING	1990	36.8(1.4)	41.8(1.7)	32.1(1.8)	40.4(1.7)	26.2(2.8)	25.4(4.5)
	1986	33.2(1.7)	37.3(2.7)	29.2(2.0)	34.8(2.0)	27.9(2.6)	25.1(4.0)
	1982	33.8(1.8)	38.0(2.4)	30.0(2.1)	35.7(2.2)	23.6(3.8)	31.4(4.9)
	1977	27.4(2.2)	32.2(2.2)	22.6(2.7)	29.9(2.4)	19.3(3.5)	9.6(2.6)
SULFUR DIOXIDE AND ACID RAIN	1990	53.7(1.5)	61.7(1.8)	46.0(1.8)	59.4(1.6)	34.6(3.1)	40.7(3.6)
	1986	56.1(1.7)	61.6(2.5)	50.6(3.4)	59.3(1.7)	42.7(4.0)	45.4(7.0)
	1982	35.2(1.7)	39.4(2.2)	31.4(1.5)	37.7(1.9)	21.6(3.5)	32.0(6.6)
	1977	19.9(1.3)	23.6(2.2)	16.4(1.5)	20.6(1.6)	17.6(1.7)	15.3(3.4)
WATER IS PART OF ALL CELLS	1990	49.8(1.3)	50.6(1.6)	49.0(2.0)	50.1(1.5)	52.1(4.4)	46.8(4.3)
	1986	47.2(2.7)	47.4(3.3)	46.9(2.8)	48.0(3.4)	48.0(2.6)	36.4(3.4)
	1977	34.1(1.5)	35.6(1.5)	32.6(2.2)	33.3(1.8)	37.3(2.6)	37.5(3.7)
WOLVES AND CARIBOU	1990	43.9(1.3)	48.5(1.6)	39.5(1.8)	49.6(1.7)	24.8(2.2)	30.4(4.1)
	1986	41.2(2.2)	46.6(1.6)	35.7(4.5)	45.0(2.5)	28.7(2.9)	25.3(4.3)
	1977	34.6(1.6)	39.4(1.7)	30.0(2.3)	38.4(1.7)	18.1(2.7)	22.0(3.2)
CELLS, TISSUES, ORGANS	1990	36.3(1.3)	36.7(1.8)	35.9(1.6)	39.0(1.4)	27.5(2.7)	22.4(3.5)
	1986	33.5(1.6)	32.8(1.9)	34.2(2.0)	35.0(1.9)	27.4(3.0)	29.1(3.7)
	1977	25.2(1.3)	25.1(1.9)	25.2(1.6)	26.6(1.4)	18.6(2.6)	19.3(5.1)
EFFECTS OF PEPSIN	1990	23.6(1.4)	26.0(1.8)	21.4(1.5)	25.5(1.8)	15.9(2.0)	18.5(1.9)
	1986	25.3(1.4)	30.2(1.8)	20.4(1.8)	26.9(1.7)	20.1(2.5)	21.2(2.2)
	1982	24.6(1.8)	29.8(2.2)	19.8(1.9)	25.2(2.1)	22.4(3.0)	14.2(4.6)
	1977	31.0(1.3)	32.7(1.6)	29.1(1.9)	32.3(1.6)	21.5(1.9)	30.6(4.1)
SEED GERMINATION	1990	15.7(0.9)	16.8(1.3)	14.6(1.3)	15.8(1.0)	14.1(2.6)	18.9(2.5)
	1986	17.6(1.4)	16.4(2.2)	18.8(1.5)	18.4(1.7)	13.9(1.7)	15.9(2.1)
	1982	21.0(1.3)	20.9(1.5)	21.1(1.5)	20.8(1.3)	22.9(3.1)	18.6(3.8)
	1977	21.0(1.3)	22.1(2.0)	20.0(1.2)	21.6(1.6)	21.2(3.2)	14.0(2.7)
EFFICIENT USE OF GRAIN AS FOOD	1990	19.7(0.9)	20.3(1.3)	19.2(1.1)	20.4(1.1)	16.6(2.3)	19.7(1.9)
	1986	22.3(1.3)	25.5(1.6)	19.1(1.9)	22.6(1.5)	21.1(2.6)	22.2(3.9)
	1982	18.4(1.2)	21.7(1.7)	15.2(1.6)	19.2(1.2)	14.5(3.6)	12.7(3.5)
	1977	21.9(0.9)	25.4(1.7)	18.5(1.2)	23.1(1.2)	18.1(2.0)	16.9(3.9)
WORLD POPULATION GROWTH	1990	14.3(0.9)	17.3(1.7)	11.5(0.8)	16.3(1.1)	8.5(2.7)	8.2(2.1)
	1986	12.6(1.1)	13.7(1.5)	11.5(1.5)	13.4(1.4)	11.4(2.7)	7.3(2.4)
	1982	12.4(1.1)	16.4(1.6)	8.6(1.0)	13.4(1.3)	7.4(1.7)	9.0(2.2)
	1977	13.8(0.8)	17.3(1.2)	10.4(1.3)	15.0(0.9)	9.3(1.4)	11.2(2.6)
SAVING RESOURCES: INSULATION	1990	66.8(1.2)	71.3(1.2)	62.6(1.9)	69.6(1.4)	63.0(3.9)	56.7(4.2)
	1986	80.7(1.7)	84.7(2.4)	76.8(1.9)	81.7(2.1)	76.4(2.8)	76.8(3.2)
	1982	88.9(1.1)	89.7(1.1)	88.2(1.6)	89.2(1.3)	86.5(2.3)	90.7(1.8)
	1977	91.6(0.9)	92.9(1.1)	90.3(1.3)	93.4(1.0)	85.9(2.6)	87.3(2.4)
SAVING RESOURCES: PLANTING	1990	69.6(1.2)	70.5(1.6)	68.8(1.7)	72.6(1.4)	60.6(3.8)	61.2(3.0)
	1986	62.8(1.6)	65.2(1.9)	60.4(1.7)	64.9(2.0)	51.8(2.8)	61.7(4.5)
	1982	47.5(1.9)	49.7(2.6)	45.4(2.6)	47.9(2.3)	44.7(3.8)	42.1(6.7)
	1977	69.9(1.2)	70.6(1.5)	69.3(1.6)	72.0(1.1)	63.4(2.4)	55.7(9.5)

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Percentage of Students Responding Correctly to Science Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
SAVING RESOURCES: THROWAWAYS	1990	49.5(1.4)	50.3(1.5)	48.8(1.7)	53.2(1.4)	40.9(3.7)	35.7(5.3)
	1986	47.2(1.7)	50.3(1.8)	44.1(2.4)	49.4(2.3)	38.0(2.8)	40.0(3.7)
	1982	58.7(1.2)	60.2(1.4)	57.2(1.6)	61.0(1.3)	47.3(2.9)	52.8(5.0)
	1977	54.2(1.6)	56.9(2.0)	51.5(1.8)	56.7(1.8)	39.3(3.0)	51.1(4.8)
SAVING RESOURCES: LAWNS	1990	42.1(1.1)	45.1(1.4)	39.2(1.6)	44.7(1.1)	31.6(3.5)	34.1(4.7)
	1986	45.5(1.4)	47.3(2.3)	43.7(2.0)	48.9(1.6)	30.7(3.8)	37.7(4.0)
	1982	63.5(2.0)	66.9(1.9)	60.1(2.4)	67.6(2.1)	42.0(2.9)	57.3(5.2)
	1977	51.0(1.3)	51.9(1.9)	50.1(2.2)	53.8(1.4)	35.2(2.9)	47.3(6.2)
PLATE TECTONICS: MOUNTAINS	1990	67.5(1.7)	67.8(2.7)	67.2(1.9)	71.2(1.8)	58.0(3.0)	53.4(3.2)
	1986	64.9(1.7)	67.6(2.0)	62.2(2.7)	69.1(2.0)	45.9(2.9)	54.9(5.2)
	1982	65.0(1.8)	67.6(1.9)	62.4(2.5)	67.7(1.9)	49.2(3.9)	64.7(4.6)
	1977	72.2(1.4)	71.9(1.9)	72.5(1.8)	75.5(1.4)	57.1(2.5)	59.8(7.3)
PLATE TECTONICS: WEATHER	1990	58.6(1.6)	60.5(1.9)	56.8(2.1)	65.5(1.5)	38.2(4.3)	37.2(4.1)
	1986	53.1(1.3)	56.3(1.7)	49.9(2.1)	58.1(1.4)	31.6(2.7)	36.6(7.1)
	1982	69.0(1.7)	70.4(2.4)	67.6(2.0)	73.8(1.6)	50.3(3.7)	45.1(4.4)
	1977	55.9(1.8)	56.0(1.7)	55.8(2.2)	61.3(1.9)	34.6(2.9)	32.4(4.4)
PLATE TECTONICS: EARTHQUAKES	1990	87.7(1.0)	88.0(1.2)	87.4(1.2)	89.4(1.0)	82.8(2.7)	81.2(2.8)
	1986	78.9(1.3)	81.1(1.9)	76.7(1.4)	81.4(1.5)	69.2(2.5)	69.6(4.8)
	1982	82.9(0.9)	82.9(1.3)	82.8(1.4)	84.9(1.2)	72.4(3.1)	78.4(2.8)
	1977	84.1(1.1)	84.2(1.3)	84.0(1.5)	87.6(1.1)	70.3(2.9)	63.5(9.2)
PLATE TECTONICS: CONTINENTS	1990	73.5(1.5)	73.0(1.9)	74.0(1.7)	78.0(1.4)	58.6(4.4)	59.6(3.6)
	1986	65.8(1.2)	67.1(1.5)	64.5(1.9)	70.5(1.4)	46.1(2.8)	52.1(5.6)
	1982	64.8(1.7)	64.1(2.3)	65.6(2.1)	69.2(1.9)	42.5(3.8)	52.3(3.1)
	1977	62.5(1.8)	63.2(1.9)	61.9(2.4)	68.3(1.8)	38.2(3.6)	41.7(5.4)
PLATE TECTONICS: MOON	1990	68.9(1.5)	67.8(1.7)	70.0(2.0)	73.6(1.4)	53.1(4.2)	55.8(3.0)
	1986	60.0(1.6)	59.6(1.9)	60.4(2.1)	64.4(2.0)	41.4(2.5)	42.8(4.2)
	1982	78.2(1.6)	77.8(2.0)	78.5(2.0)	82.6(1.3)	58.7(2.9)	59.9(3.9)
	1977	64.6(1.8)	61.5(1.6)	67.5(2.6)	69.3(1.7)	46.7(3.0)	36.3(5.9)
PRESENT ENERGY SOURCE IN U.S.	1990	42.3(1.6)	46.0(2.1)	38.8(1.7)	46.7(1.5)	32.5(4.6)	21.8(3.8)
	1986	41.3(1.6)	45.5(1.9)	37.3(2.4)	44.4(1.9)	32.2(3.1)	23.2(3.3)
	1982	65.9(1.8)	67.2(2.4)	64.8(1.8)	70.5(1.5)	47.4(2.7)	50.2(6.7)
	1977	56.4(1.7)	61.6(2.1)	51.4(2.1)	61.3(2.0)	37.0(2.2)	36.8(5.1)
COMPONENTS OF SOLAR SYSTEM	1990	72.6(1.1)	71.5(1.4)	73.6(1.5)	75.8(1.2)	61.9(3.5)	66.8(5.3)
	1986	65.5(1.6)	67.7(2.3)	63.3(2.1)	67.7(2.0)	56.5(2.7)	59.4(5.9)
	1982	70.9(1.5)	72.1(2.1)	69.8(1.8)	73.6(1.4)	59.7(4.9)	62.5(3.9)
	1977	70.3(1.5)	71.1(2.0)	69.6(1.7)	73.9(1.6)	56.0(3.6)	55.1(4.8)
ACCELERATION OF BALL ON RAMP	1990	60.3(1.3)	66.3(1.6)	54.6(1.7)	64.8(1.3)	45.4(4.0)	48.1(4.1)
	1986	59.8(1.8)	65.8(1.9)	53.7(2.4)	63.8(2.2)	46.0(3.1)	44.8(4.2)
	1982	63.3(1.7)	66.7(1.9)	60.1(2.1)	67.7(1.6)	44.1(5.0)	51.9(3.3)
	1977	64.0(1.3)	69.6(1.9)	58.5(1.4)	68.8(1.2)	41.8(2.8)	46.8(4.8)
WEATHER: WIND SPEED	1990	88.8(0.9)	88.0(1.3)	89.7(1.0)	92.2(0.7)	79.1(4.3)	78.5(5.0)
	1986	87.0(1.0)	87.9(1.6)	86.1(1.4)	89.7(1.1)	75.8(2.1)	79.6(4.5)
	1982	77.5(1.3)	77.4(1.6)	77.5(1.8)	80.1(1.1)	66.1(4.6)	67.0(5.0)
	1977	87.7(1.1)	86.5(1.7)	88.8(0.9)	91.4(0.7)	70.3(3.1)	80.1(4.5)
WEATHER: SUNRISE	1990	63.2(1.3)	58.8(1.5)	67.4(1.9)	65.9(1.4)	51.6(3.7)	58.8(3.6)
	1986	64.0(1.2)	61.6(1.5)	66.5(1.5)	65.1(1.3)	57.4(2.4)	66.2(4.5)
	1982	54.2(1.3)	53.5(1.8)	54.8(1.7)	54.7(1.5)	50.8(3.3)	55.2(6.2)
	1977	51.1(1.6)	49.8(2.0)	52.5(1.8)	52.7(1.9)	45.0(2.9)	39.5(6.0)

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Percentage of Students Responding Correctly to Science Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
WEATHER: RAINFALL	1990	75.8(1.2)	75.1(1.5)	76.4(1.5)	79.2(1.2)	64.7(3.5)	64.8(3.4)
	1986	76.4(1.2)	77.1(1.8)	75.8(1.3)	81.3(1.3)	59.6(3.5)	59.7(5.3)
	1982	69.0(1.5)	69.3(1.9)	68.7(1.8)	72.9(1.4)	52.2(3.4)	50.8(5.3)
	1977	79.8(1.3)	79.8(1.7)	79.9(1.6)	84.1([illegible].1)	59.7(2.3)	70.0(5.3)
WEATHER: HUMIDITY	1990	83.2(1.2)	81.7(1.6)	84.6(1.2)	87.0(0.9)	70.9(4.4)	71.9(4.8)
	1986	80.0(1.1)	79.7(1.4)	80.3(2.2)	83.8(1.4)	65.2(2.8)	68.7(4.7)
	1982	68.9(1.5)	70.6(1.7)	67.3(2.1)	72.0(1.6)	56.8(3.8)	49.9(3.8)
	1977	80.6(1.0)	79.9(1.4)	81.4(1.0)	83.5(1.0)	67.9(2.2)	72.5(3.8)
WEATHER: FIRST DAY OF SPRING	1990	60.6(1.2)	62.3(1.6)	59.0(1.3)	63.0(1.3)	52.7(2.9)	57.5(3.2)
	1986	64.2(1.0)	64.8(1.6)	63.6(2.5)	66.6(1.2)	55.5(2.4)	56.9(3.2)
	1982	65.1(1.2)	66.3(1.6)	64.0(1.9)	66.3(1.4)	59.2(2.3)	60.8(4.8)
	1977	62.0(1.4)	64.8(1.6)	59.2(1.8)	63.4(1.4)	61.2(2.8)	41.0(7.9)
WEATHER: AVERAGE TEMPERATURE	1990	60.2(1.6)	60.7(1.9)	59.7(2.0)	63.7(1.6)	50.9(3.4)	43.5(5.9)
	1986	61.0(1.6)	62.2(1.8)	59.7(2.3)	62.8(1.9)	54.8(2.8)	53.0(5.6)
	1982	54.2(1.3)	55.5(1.5)	53.0(1.7)	56.1(1.4)	48.3(3.2)	41.5(4.5)
	1977	62.2(1.3)	61.2(1.7)	63.2(1.5)	64.9(1.3)	49.9(3.3)	56.5(5.6)
COMMUNICATING ON THE MOON	1990	61.5(1.3)	69.9(1.8)	53.4(1.7)	63.6(1.4)	49.4(3.1)	63.9(5.2)
	1986	60.5(1.2)	67.0(2.1)	54.1(2.4)	61.8(1.5)	53.4(3.1)	55.9(6.2)
	1982	55.5(1.5)	66.4(1.3)	45.2(2.0)	57.7(1.7)	42.2(2.6)	51.2(3.0)
	1977	59.3(1.7)	66.1(2.3)	52.4(2.1)	62.8(1.7)	45.8(2.8)	37.3(4.8)
HALF-LIFE	1990	50.0(1.4)	50.4(1.7)	49.7(1.7)	50.1(1.5)	49.9(3.2)	49.4(6.9)
	1986	55.1(1.4)	59.7(1.7)	50.5(2.3)	56.1(1.7)	51.0(2.9)	48.6(3.2)
	1982	50.6(2.1)	54.0(2.4)	47.5(2.5)	49.7(2.5)	54.7(2.5)	53.5(4.2)
	1977	49.6(1.5)	50.3(1.8)	48.8(2.0)	51.4(1.8)	44.4(3.6)	35.9(5.4)
SPEED OF LIGHT AND SOUND	1990	18.5(1.1)	21.4(1.5)	15.8(1.4)	20.4(1.2)	11.5(2.0)	13.1(2.9)
	1986	14.9(1.3)	17.6(1.4)	12.4(1.8)	15.8(1.5)	10.5(1.3)	11.2(3.9)
	1977	16.7(1.3)	17.9(1.7)	15.4(1.5)	17.9(1.4)	13.0(1.8)	10.8(3.9)
ANGLE OF REFLECTION	1990	56.1(1.4)	64.2(1.6)	48.4(2.0)	59.8(1.4)	40.6(3.2)	51.9(4.4)
	1986	50.8(2.3)	59.9(3.6)	41.8(2.1)	51.9(2.9)	43.9(2.8)	48.9(3.6)
	1982	46.9(1.9)	55.8(2.8)	38.6(1.6)	50.5(1.9)	29.6(3.7)	38.7(5.0)
	1977	47.8(1.1)	56.0(1.8)	39.6(1.6)	51.0(1.3)	31.9(2.3)	35.8(5.4)
EARTH'S CRUST: OLDEST LAYERS	1990	50.7(1.5)	50.1(1.8)	51.3(2.1)	55.2(1.5)	36.5(3.9)	36.4(5.4)
	1986	46.1(1.9)	44.5(1.9)	47.7(3.5)	50.0(2.2)	31.0(2.3)	32.1(3.8)
	1977	42.6(1.5)	42.5(1.9)	42.6(1.9)	46.6(1.6)	22.9(2.3)	30.8(5.2)
EARTH'S CRUST: CURVED LAYERS	1990	44.3(1.5)	44.9(1.8)	43.8(1.8)	46.0(1.6)	38.1(3.0)	39.7(4.3)
	1986	41.6(1.6)	44.2(1.7)	39.0(2.4)	42.7(1.9)	34.9(2.8)	40.2(4.0)
	1977	47.2(1.6)	50.6(1.9)	44.2(1.9)	48.9(1.7)	41.5(3.6)	35.5(3.4)
MEASURING CURRENT IN A CIRCUIT	1990	43.1(1.1)	40.6(1.3)	45.5(1.6)	43.0(1.3)	45.2(2.4)	39.2(3.6)
	1986	46.0(1.6)	43.9(2.5)	48.1(1.7)	46.0(1.9)	44.4(2.3)	42.3(3.6)
	1982	40.1(1.2)	40.4(1.9)	39.8(1.6)	41.3(1.3)	34.7(3.2)	43.7(5.9)
	1977	39.1(1.2)	37.0(2.2)	41.2(1.8)	39.1(1.2)	36.5(3.3)	49.2(4.2)
MOVEMENT OF HEATED WATER	1990	37.5(1.3)	40.4(1.4)	34.8(1.8)	41.0(1.4)	27.4(3.0)	26.8(3.4)
	1986	37.8(1.2)	44.3(1.4)	31.3(2.2)	41.3(1.6)	20.3(2.2)	34.2(3.3)
	1977	34.4(1.9)	40.9(2.7)	27.9(1.6)	38.6(2.0)	15.5(2.1)	17.0(3.9)
EFFECT OF CLEARING FORESTS	1990	36.1(1.3)	40.3(1.5)	32.2(1.7)	39.9(1.3)	27.1(2.9)	21.1(3.0)
	1986	36.2(1.4)	41.0(1.9)	31.5(1.8)	40.6(1.6)	21.4(1.9)	19.9(3.9)
	1982	38.6(1.4)	42.5(2.0)	34.8(1.4)	42.2(1.5)	24.0(3.0)	24.8(5.4)
	1977	44.7(1.7)	52.1(2.0)	37.3(2.3)	49.0(1.7)	26.1(3.1)	23.4(4.0)

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Percentage of Students Responding Correctly to Science Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
DESCRIBING THE ROCK CYCLE	1990	29.6(1.2)	29.7(1.5)	29.5(1.8)	29.8(1.4)	29.8(3.0)	26.2(4.3)
	1986	29.8(1.2)	30.3(3.5)	29.4(3.1)	31.0(1.6)	24.8(2.2)	26.1(3.2)
	1982	30.0(1.7)	30.7(2.4)	29.4(2.1)	32.1(2.0)	18.6(2.1)	26.2(3.9)
	1977	31.0(1.6)	28.4(2.1)	33.7(1.5)	32.2(2.0)	26.6(2.8)	19.4(6.1)
INDUCTION OF ELECTRIC CURRENT	1990	44.9(1.5)	52.1(2.1)	38.0(2.0)	47.4(1.7)	38.1(3.9)	33.6(4.1)
	1986	46.2(1.8)	54.0(2.8)	38.6(1.9)	49.5(2.2)	32.0(2.6)	36.5(4.5)
	1982	34.9(1.5)	44.2(1.8)	26.3(2.0)	36.5(1.6)	28.0(2.7)	28.5(4.6)
	1977	45.0(1.7)	51.1(2.2)	39.3(1.8)	47.0(1.9)	35.7(3.0)	31.7(5.7)
BALANCING BLOCKS ON SEESAW	1990	38.6(1.3)	50.6(1.8)	27.1(1.4)	43.9(1.2)	20.5(2.9)	25.3(3.5)
	1986	38.9(1.3)	45.5(1.7)	32.4(2.1)	43.8(1.6)	18.7(2.8)	28.4(3.4)
	1982	42.3(1.6)	54.0(2.1)	31.2(2.0)	46.1(1.8)	23.4(2.1)	29.1(3.3)
	1977	42.8(2.0)	52.9(2.5)	31.5(2.3)	48.2(2.1)	18.9(2.5)	21.6(2.8)
AIR MASSES OVER OCEANS	1990	19.1(1.3)	20.6(1.4)	17.6(1.6)	20.8(1.4)	13.2(2.0)	16.0(2.9)
	1986	18.5(1.4)	21.1(2.0)	15.9(1.9)	19.1(1.7)	15.8(2.3)	17.0(2.8)
	1977	19.0(1.0)	21.2(1.6)	17.0(1.3)	20.4(1.3)	13.8(1.2)	10.9(2.4)
PRODUCT Z: ARTHRITIS	1990	47.9(2.0)	44.9(2.2)	51.1(2.1)	54.6(1.8)	28.6(5.5)	30.6(3.5)
	1986	42.5(2.3)	39.9(2.8)	45.1(2.5)	47.6(2.4)	25.6(3.8)	27.9(4.0)
	1982	38.1(1.9)	38.9(2.5)	37.4(1.9)	40.6(2.0)	25.8(3.5)	29.3(5.1)
	1977	41.2(1.3)	36.2(2.0)	45.7(1.7)	44.7(1.4)	24.0(2.9)	29.6(4.3)
PRODUCT Z: HARM	1990	80.7(1.4)	78.4(1.9)	83.1(1.4)	86.3(1.1)	59.7(4.8)	73.7(3.0)
	1986	81.5(1.4)	79.1(2.0)	83.7(1.4)	84.6(1.6)	67.0(3.3)	77.2(4.1)
	1982	85.1(1.3)	81.5(2.1)	88.6(1.2)	87.5(1.6)	73.4(3.1)	77.3(5.8)
	1977	77.5(1.4)	75.5(1.8)	79.4(1.5)	81.4(1.5)	58.3(2.5)	65.8(4.5)
PRODUCT Z: PAIN RELLIEF	1990	83.9(1.2)	82.5(1.5)	85.4(1.5)	87.4(0.9)	75.6(5.4)	72.3(4.2)
	1986	85.3(1.0)	82.4(1.7)	88.3(1.2)	87.4(1.1)	76.4(2.5)	81.8(2.8)
	1982	82.7(1.2)	80.9(1.6)	84.4(1.4)	84.8(1.5)	72.7(2.5)	76.4(3.4)
	1977	80.9(1.1)	78.3(2.0)	83.3(1.1)	84.7(1.0)	63.6(2.4)	67.8(4.6)
PRODUCT Z: FEEL BETTER	1990	81.7(1.4)	79.8(1.9)	83.6(1.5)	86.9(1.2)	63.7(4.2)	70.6(3.1)
	1986	83.5(1.2)	80.9(1.7)	86.0(1.3)	87.5(1.0)	65.5(4.0)	76.3(2.4)
	1982	83.1(1.4)	81.0(1.8)	85.2(1.3)	86.6(1.3)	68.6(4.1)	69.6(4.8)
	1977	76.4(1.6)	73.7(2.3)	78.8(1.5)	81.0(1.5)	56.5(3.1)	56.7(5.3)
USE OF CONTROLS IN EXPERIMENTS	1990	70.1(1.5)	67.6(1.7)	72.8(1.6)	73.0(1.6)	62.3(4.2)	62.9(3.4)
	1986	71.2(1.4)	69.4(1.9)	73.1(1.7)	73.3(1.7)	64.6(2.4)	64.5(4.3)
	1977	71.1(1.2)	69.5(1.6)	72.8(1.6)	73.8(1.4)	58.0(2.2)	66.2(5.7)
USING A BRANCHING KEY: SHAPE	1990	70.8(1.5)	69.0(1.8)	72.7(1.8)	75.4(1.4)	54.1(4.9)	62.5(3.1)
	1986	69.5(1.3)	66.9(2.6)	72.0(1.4)	73.8(1.5)	53.6(3.0)	54.5(3.9)
	1982	70.8(1.2)	69.5(1.5)	72.0(1.6)	72.6(1.3)	62.2(2.9)	63.0(5.8)
	1977	67.0(1.6)	64.9(1.9)	69.0(1.9)	70.2(1.4)	57.9(3.7)	43.3(6.4)
USING A BRANCHING KEY: COLOR	1990	43.9(1.5)	44.2(2.0)	43.7(1.9)	47.7(1.5)	31.0(3.6)	37.4(3.8)
	1986	40.4(1.6)	40.3(1.8)	40.6(2.1)	42.3(2.1)	31.3(2.3)	40.2(3.4)
	1982	39.3(1.3)	38.1(1.5)	40.4(1.8)	41.8(1.3)	30.9(2.4)	28.3(5.7)
	1977	34.6(1.5)	33.6(1.9)	35.6(1.5)	37.6(1.5)	22.0(3.1)	22.2(4.3)
READING A PRESSURE GAUGE	1990	71.1(1.4)	74.1(1.9)	67.9(1.8)	75.2(1.4)	58.3(3.6)	60.3(3.8)
	1986	66.7(1.2)	71.6(1.7)	61.8(2.7)	69.9(1.7)	53.7(2.1)	59.8(3.8)
	1982	61.6(1.3)	65.4(2.1)	57.8(1.8)	64.6(1.6)	48.3(3.2)	47.1(3.6)
	1977	57.0(1.9)	62.4(2.0)	51.7(2.4)	59.9(1.9)	43.7(4.2)	44.7(5.3)
ESTIMATING LENGTH OF A LINE	1990	58.4(1.3)	60.5(1.9)	56.2(1.6)	60.6(1.5)	53.2(4.3)	50.9(4.8)
	1986	62.4(1.4)	65.3(2.0)	59.6(2.4)	64.6(1.7)	55.5(3.6)	53.0(3.3)
	1982	63.6(1.9)	67.3(3.0)	60.2(1.5)	65.4(2.1)	52.3(3.5)	65.2(6.3)
	1977	51.7(1.7)	54.3(1.8)	49.2(2.6)	54.4(1.8)	43.1(3.2)	39.2(5.3)

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Percentage of Students Responding Correctly to Science Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
RAIN AND CORN GROWTH	1990	57.3(1.6)	59.6(2.0)	54.9(1.9)	58.0(2.0)	57.0(3.5)	51.3(3.2)
	1986	57.7(1.1)	59.0(2.0)	56.5(1.6)	58.4(1.5)	52.6(2.6)	56.5(5.2)
	1982	60.7(2.2)	62.3(2.4)	59.2(2.6)	63.3(2.5)	47.1(2.9)	53.4(5.2)
	1977	55.5(1.1)	55.2(1.7)	55.8(1.6)	57.6(1.1)	47.9(2.6)	44.2(5.3)
FOOD SHORTAGE: BIRTH RATE	1990	64.3(1.4)	62.9(2.0)	65.8(1.5)	67.0(1.6)	58.3(4.4)	56.9(2.9)
	1986	66.4(2.4)	66.1(3.5)	66.7(2.0)	69.5(2.9)	54.5(1.9)	56.6(3.5)
	1982	68.8(1.4)	66.1(2.0)	71.4(1.8)	72.0(1.6)	53.5(3.3)	57.0(4.5)
	1977	70.8(1.1)	69.2(1.5)	72.4(1.5)	74.7(1.0)	54.7(2.7)	49.5(6.3)
FOOD SHORTAGE: AMOUNT OF FOOD	1990	90.7(1.0)	89.1(1.4)	92.3(1.0)	93.9(0.8)	83.2(3.1)	78.5(4.4)
	1986	89.0(0.7)	89.3(1.1)	88.6(1.1)	91.5(0.8)	78.9(2.8)	82.4(3.4)
	1982	87.0(1.0)	86.8(1.1)	87.1(1.3)	90.0(1.2)	72.5(3.4)	77.6(2.5)
	1977	89.7(0.9)	89.5(1.1)	89.8(1.1)	93.0(0.8)	71.4(3.1)	88.6(3.0)
FOOD SHORTAGE: MARKETS	1990	56.3(1.4)	55.1(2.0)	57.7(1.9)	61.9(1.2)	40.2(5.2)	39.1(2.9)
	1986	59.9(1.6)	62.3(2.1)	57.5(2.0)	64.3(1.8)	40.2(3.1)	52.9(4.4)
	1982	61.5(1.9)	65.4(2.7)	57.8(2.0)	66.5(2.0)	37.7(2.4)	47.7(3.2)
	1977	57.7(1.7)	58.6(2.2)	56.9(2.1)	62.9(1.6)	36.5(3.3)	33.1(6.2)
FOOD SHORTAGE: WEATHER	1990	57.3(1.6)	55.3(1.9)	59.4(1.9)	60.3(1.9)	48.0(2.3)	49.3(5.0)
	1986	56.1(2.3)	57.5(2.6)	54.6(2.7)	58.0(2.7)	48.7(3.9)	49.9(4.5)
	1982	52.1(1.4)	52.3(2.3)	51.8(1.9)	53.9(1.5)	43.2(3.3)	44.3(2.6)
	1977	59.2(1.3)	62.0(1.5)	56.4(1.6)	61.5(1.2)	44.7(2.8)	57.1(5.1)
PREDICTING SNOWFALL	1990	61.8(1.5)	62.5(1.7)	61.1(2.1)	65.7(1.5)	44.7(3.7)	59.0(4.2)
	1986	61.9(2.3)	61.9(2.6)	61.8(2.5)	67.4(2.7)	40.5(3.9)	47.9(4.9)
	1977	47.6(1.6)	47.0(2.2)	48.2(1.6)	49.9(1.8)	39.3(4.7)	34.2(4.6)
LAB BALANCE: COLOR OF ROCK	1990	82.3(1.6)	80.0(2.0)	84.6(1.6)	85.2(1.1)	73.0(6.1)	74.0(2.7)
	1986	81.3(1.2)	78.5(1.7)	84.2(1.8)	85.0(1.4)	70.0(2.6)	66.5(4.4)
	1982	74.9(1.4)	73.9(2.3)	75.8(1.7)	78.7(1.5)	59.5(4.3)	60.0(3.6)
	1977	59.6(1.8)	57.1(1.9)	62.0(2.7)	63.2(1.9)	43.5(3.2)	41.2(5.0)
LAB BALANCE: ACCURACY	1990	57.4(1.5)	58.1(1.7)	56.8(2.3)	59.0(1.5)	51.5(5.8)	53.9(3.9)
	1986	56.9(2.4)	56.5(2.2)	57.3(3.2)	60.1(2.9)	45.6(2.0)	48.0(8.5)
	1982	56.3(0.8)	58.1(1.6)	54.5(1.5)	58.1(1.1)	46.4(4.1)	52.4(3.1)
	1977	54.4(1.6)	53.9(1.9)	54.9(2.1)	56.7(1.7)	47.6(3.1)	36.4(6.4)
LAB BALANCE: GRAMS/OUNCES	1990	41.0(1.3)	41.3(1.6)	40.7(2.0)	41.7(1.6)	37.8(3.5)	39.1(3.3)
	1986	43.3(2.2)	41.8(2.2)	44.9(3.0)	44.4(2.8)	40.4(3.0)	37.5(4.1)
	1982	41.3(1.6)	43.6(2.1)	39.1(2.0)	42.2(1.7)	37.2(4.3)	37.5(5.4)
	1977	39.6(1.2)	39.1(1.5)	40.1(1.6)	40.4(1.2)	34.6(2.7)	35.6(5.8)
HUMAN ERROR IN MEASURING TIME	1990	52.7(1.8)	57.7(2.0)	47.4(2.1)	54.0(2.0)	47.2(5.5)	48.3(2.9)
	1986	57.1(2.5)	58.9(2.1)	55.3(3.7)	60.8(3.0)	41.3(4.0)	48.9(3.9)
	1982	48.6(1.7)	54.1(2.1)	43.4(1.8)	49.5(1.7)	43.3(5.2)	42.5(4.7)
	1977	58.5(1.6)	63.2(1.9)	54.1(2.1)	61.4(1.9)	45.0(3.0)	48.0(7.5)
VOLUME EQUATION	1990	57.1(2.2)	53.8(2.7)	60.7(2.4)	60.4(2.1)	50.5(6.8)	41.2(4.1)
	1986	55.3(1.9)	51.9(2.4)	58.7(2.2)	58.4(2.3)	42.8(4.5)	42.5(5.7)
	1982	45.3(1.8)	44.7(2.2)	45.8(1.9)	48.0(2.2)	33.0(3.1)	31.5(2.6)
	1977	33.1(1.7)	30.1(1.5)	35.8(2.7)	36.0(2.0)	19.0(2.1)	21.9(3.5)
MEASUREMENT ERROR: SPEEDOMETER	1990	36.8(1.5)	40.3(2.0)	33.1(1.8)	34.3(1.3)	51.8(6.0)	28.9(4.4)
	1986	34.3(1.0)	40.9(1.8)	27.9(1.5)	31.0(1.3)	45.7(2.2)	41.0(3.1)
	1982	40.7(2.2)	45.2(2.6)	36.6(2.4)	37.5(2.2)	59.4(4.1)	38.8(6.0)
	1977	44.3(1.7)	50.4(2.3)	38.3(2.1)	41.2(2.0)	59.1(1.9)	50.8(5.9)
MEASUREMENT ERROR: TAPEMEASURE	1990	46.4(1.4)	44.5(1.7)	48.4(2.1)	47.7(1.2)	42.2(6.0)	40.7(3.7)
	1986	46.3(1.6)	45.5(1.9)	47.1(2.2)	45.8(1.9)	48.7(2.8)	45.7(4.1)
	1982	43.9(1.4)	40.5(2.2)	47.1(1.8)	45.2(1.4)	36.9(2.7)	42.3(5.2)
	1977	46.0(1.2)	43.6(1.3)	48.3(2.0)	47.2(1.5)	40.6(2.7)	42.5(5.1)

NAEP 1990 SCIENCE TREND ASSESSMENT—AGE 13

Percentage of Students Responding Correctly to Science Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
MEASUREMENT ERROR: COMPUTER	1990	24.6(1.2)	24.2(1.6)	25.1(1.4)	20.3(1.2)	41.8(3.5)	27.2(3.3)
	1986	24.5(1.3)	25.6(1.9)	23.5(1.9)	21.4(1.8)	35.8(2.8)	34.9(4.2)
	1982	28.6(1.6)	33.3(2.1)	24.3(2.0)	25.6(1.5)	44.0(3.5)	30.2(5.4)
	1977	31.6(1.7)	33.0(2.3)	30.2(1.8)	28.7(1.8)	42.8(2.9)	41.5(4.9)
MEANING OF 20% CHANCE OF RAIN	1990	21.5(1.1)	24.7(1.7)	18.0(1.2)	22.2(1.1)	21.5(4.7)	18.2(2.3)
	1986	19.6(0.9)	20.6(1.3)	18.7(1.5)	21.4(1.2)	15.8(3.1)	9.7(2.1)
	1982	15.7(1.3)	19.6(1.7)	12.1(1.7)	16.1(1.7)	14.0(2.5)	14.1(1.5)
	1977	14.2(0.9)	16.0(1.3)	12.5(1.3)	15.6(1.2)	9.2(1.6)	7.1(1.7)
SEASONAL RAINFALL GRAPH	1990	38.4(1.7)	42.1(2.2)	34.4(1.7)	42.6(2.0)	23.2(3.2)	32.2(3.4)
	1986	36.0(1.9)	39.5(2.9)	32.6(1.8)	38.0(2.3)	30.5(2.7)	27.0(4.5)
	1977	32.5(1.7)	35.1(2.0)	30.0(2.1)	34.2(1.8)	27.5(3.0)	20.3(4.9)
MOLD GROWTH EXPERIMENT	1990	21.0(1.4)	23.8(1.8)	18.0(1.4)	22.8(1.7)	18.0(3.2)	10.1(2.1)
	1986	20.0(1.3)	20.9(1.6)	19.2(1.5)	21.7(1.5)	14.2(1.4)	15.2(3.4)
	1982	23.4(1.1)	23.8(1.5)	23.1(1.8)	24.7(1.3)	17.1(2.6)	18.7(3.5)
	1977	28.9(1.2)	29.4(1.8)	28.4(1.3)	31.9(1.5)	15.2(2.2)	15.7(4.2)
INVENTION OF TELEPHONE	1990	52.9(1.7)	59.4(2.2)	46.0(2.0)	58.0(1.7)	36.4(5.3)	44.8(4.7)
	1986	49.6(1.5)	58.4(2.3)	40.9(1.7)	52.6(1.6)	38.6(2.9)	36.7(4.1)
	1977	49.0(1.4)	55.5(1.5)	42.7(1.8)	51.6(1.3)	37.1(4.1)	41.5(4.7)

NAEP 1990 SCIENCE TREND ASSESSMENT—AGE 17

Percentage of Students Responding Correctly to Science Trend Items

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
FINDING CAUSE OF A SORE THROAT	1990	88.0(1.1)	84.7(1.3)	91.0(1.2)	92.3(0.9)	78.6(3.7)	75.0(4.9)
	1986	87.4(0.6)	83.5(1.3)	91.3(1.3)	90.0(0.6)	77.0(2.5)	82.8(2.1)
	1982	84.4(1.2)	79.6(1.6)	88.7(1.2)	86.6(1.3)	74.3(2.8)	74.7(3.8)
	1977	87.2(0.7)	83.9(1.2)	90.2(1.0)	88.4(0.8)	78.9(2.8)	88.2(2.4)
PLANTS BEND TOWARD LIGHT	1990	67.1(1.4)	71.5(1.6)	63.2(1.9)	73.5(1.1)	42.5(4.0)	55.8(4.5)
	1986	67.9(1.4)	70.3(2.1)	65.4(1.9)	73.5(1.2)	43.7(4.7)	58.2(4.6)
	1982	68.8(1.3)	71.4(2.0)	66.1(1.9)	73.6(1.2)	47.1(3.1)	47.6(3.6)
OBSERVING A SEALED AQUARIUM	1990	75.3(1.3)	78.1(1.5)	72.8(1.8)	79.0(1.0)	62.8(4.3)	68.3(4.7)
	1986	77.6(1.3)	79.2(1.8)	76.1(1.8)	79.2(1.5)	74.8(4.0)	69.3(5.2)
	1982	79.4(1.4)	80.0(1.6)	78.9(1.7)	81.2(1.7)	71.8(3.7)	73.1(3.5)
	1977	83.1(0.9)	83.0(1.3)	83.1(1.1)	84.8(0.9)	75.5(1.9)	69.6(3.9)
TISSUES AND CELLS	1990	65.7(1.4)	69.5(1.8)	62.4(1.8)	67.1(1.6)	58.6(3.2)	67.5(5.2)
	1986	68.3(1.5)	69.6(1.8)	67.1(1.7)	70.7(1.8)	59.8(3.3)	58.0(4.9)
	1982	63.7(1.5)	64.3(1.9)	63.1(2.0)	65.8(1.7)	54.1(2.8)	57.0(6.1)
	1977	65.2(1.2)	67.0(1.7)	63.5(1.4)	66.9(1.4)	54.8(2.1)	60.3(3.6)
MELTING CRUSHED ICE	1990	64.6(1.9)	70.3(2.2)	58.8(2.2)	70.3(1.7)	41.2(6.0)	52.9(6.7)
	1986	59.3(1.2)	66.3(1.4)	52.8(2.0)	63.9(1.3)	39.6(3.7)	41.6(5.1)
	1982	61.6(1.4)	69.1(1.3)	54.8(2.0)	66.9(1.4)	35.5(3.0)	37.7(4.5)
	1977	61.2(1.3)	70.5(1.8)	52.2(1.5)	65.6(1.1)	31.4(2.5)	51.1(4.8)
FUNCTION OF RED BLOOD CELLS	1990	64.4(1.2)	68.8(1.6)	60.6(1.7)	66.5(1.3)	55.0(3.4)	62.7(6.2)
	1986	63.8(1.4)	67.0(1.5)	60.7(2.6)	63.5(1.6)	67.2(4.1)	60.2(5.2)
	1982	64.5(2.0)	69.2(1.9)	60.2(2.6)	66.1(1.7)	58.9(4.9)	56.0(8.9)
	1977	65.9(1.2)	69.2(1.7)	62.7(1.8)	66.2(1.3)	60.3(3.6)	67.4(5.5)
WATER TEMPERATURE FOR SWIMMING	1990	44.5(1.7)	51.3(1.8)	37.7(1.9)	49.4(2.0)	25.4(3.3)	26.4(4.1)
	1986	46.8(1.2)	54.5(1.9)	39.8(1.6)	51.7(1.3)	28.8(2.6)	24.5(3.4)
	1977	48.1(1.5)	58.6(1.9)	37.8(1.8)	52.2(1.6)	22.7(3.4)	41.2(6.2)
SULFUR DIOXIDE AND ACID RAIN	1990	71.1(1.6)	77.3(1.9)	64.9(1.8)	76.4(1.2)	53.6(4.1)	51.2(***)
	1986	65.2(1.0)	72.2(1.7)	58.8(1.6)	69.1(1.2)	51.4(3.4)	44.4(4.7)
	1982	44.7(1.5)	56.5(2.2)	34.2(1.9)	47.9(1.6)	26.1(2.9)	38.0(4.5)
	1977	31.0(2.0)	39.7(2.2)	22.3(1.9)	33.5(2.3)	17.9(2.3)	18.1(3.6)
SEED GERMINATION	1990	34.1(1.2)	37.3(1.6)	31.2(1.5)	35.3(1.6)	29.1(2.7)	30.3(4.7)
	1986	38.8(1.6)	43.6(2.4)	34.0(1.4)	40.2(1.9)	37.6(3.0)	27.5(3.8)
	1982	33.7(1.3)	36.4(1.7)	30.9(2.1)	35.1(1.4)	27.7(3.6)	25.8(4.9)
EFFICIENT USE OF GRAIN AS FOOD	1990	22.9(1.0)	24.8(1.4)	21.3(1.4)	25.4(1.1)	15.0(2.2)	17.8(3.7)
	1986	25.6(1.4)	27.9(2.1)	23.2(1.7)	28.0(1.7)	13.3(1.8)	26.1(5.1)
	1982	29.7(1.9)	33.3(2.2)	26.3(2.1)	30.8(2.2)	25.0(2.1)	31.2(8.8)
	1977	32.0(0.9)	35.6(1.6)	28.5(1.0)	33.6(1.1)	23.4(2.8)	25.2(5.3)
WORLD POPULATION GROWTH	1990	17.8(1.0)	24.3(1.6)	12.1(1.1)	20.6(1.1)	10.3(1.9)	10.3(2.3)
	1986	19.3(1.7)	23.9(2.5)	14.7(1.5)	21.2(2.0)	10.4(2.0)	15.0(3.8)
	1982	18.9(1.0)	25.1(1.6)	13.1(1.1)	21.4(1.2)	8.4(1.9)	6.6(1.7)
	1977	22.4(1.2)	29.5(1.7)	15.4(1.3)	24.8(1.2)	9.1(1.6)	10.9(4.1)
SAVING RESOURCES: INSULATION	1990	74.0(1.2)	76.6(1.5)	71.8(1.4)	75.7(1.4)	71.2(2.4)	66.5(4.1)
	1986	82.9(1.2)	83.7(1.8)	82.1(1.6)	83.1(1.5)	84.0(2.6)	80.3(2.8)
	1982	90.0(1.0)	90.7(1.5)	89.2(1.2)	91.2(1.2)	84.0(2.1)	90.9(2.5)
	1977	94.2(0.5)	95.2(0.7)	93.2(0.7)	95.8(0.5)	86.8(1.8)	84.1(3.1)
SAVING RESOURCES: PLANTING	1990	76.9(1.2)	79.8(1.4)	74.3(1.9)	80.4(1.3)	64.2(3.2)	70.0(4.5)
	1986	71.1(1.6)	74.5(1.9)	67.8(2.0)	74.7(2.1)	55.7(4.1)	62.3(4.7)
	1982	64.0(1.0)	64.3(1.6)	63.7(1.8)	66.9(1.2)	49.5(3.0)	57.5(6.9)
	1977	79.8(0.8)	82.6(0.9)	77.1(1.2)	82.5(0.7)	61.7(2.5)	77.3(2.9)

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Percentage of Students Responding Correctly to Science Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
SAVING RESOURCES: THROWAWAYS	1990	73.0(1.2)	74.1(1.3)	72.0(1.7)	77.4(1.1)	58.1(3.0)	64.7(4.9)
	1986	67.2(1.3)	69.9(1.8)	64.4(1.4)	70.4(1.6)	55.3(2.4)	55.1(3.6)
	1982	68.7(1.5)	69.9(2.2)	67.5(2.0)	72.0(1.6)	50.6(1.7)	58.8(3.7)
	1977	72.9(0.8)	76.5(1.2)	69.4(1.0)	76.3(0.9)	52.8(2.7)	64.5(4.7)
SAVING RESOURCES: LAWNS	1990	67.8(1.6)	68.6(1.8)	67.2(2.1)	73.3(1.2)	47.8(3.9)	62.9(3.6)
	1986	69.4(1.6)	69.5(1.9)	69.3(1.9)	73.6(1.7)	50.6(3.6)	60.5(8.1)
	1982	71.0(1.3)	74.4(1.6)	67.4(1.6)	74.5(1.4)	53.3(3.1)	64.5(6.1)
	1977	63.4(1.4)	65.6(2.0)	61.2(1.8)	66.1(1.5)	45.3(3.2)	60.8(5.9)
PLATE TECTONICS: MOUNTAINS	1990	73.8(1.6)	76.5(1.6)	71.4(2.2)	79.4(1.4)	51.2(3.5)	66.0(5.6)
	1986	72.5(1.3)	74.5(2.0)	70.5(1.5)	77.6(1.5)	49.8(3.1)	59.0(8.7)
	1982	69.4(1.5)	72.3(1.8)	66.4(2.3)	72.8(1.6)	50.1(3.3)	63.7(4.3)
	1977	79.1(1.0)	80.4(1.3)	77.8(1.3)	81.8(0.9)	59.4(2.6)	78.1(5.1)
PLATE TECTONICS: WEATHER	1990	76.8(1.5)	78.5(1.6)	75.3(2.1)	82.9(1.2)	58.6(4.7)	60.0(4.5)
	1986	73.9(1.6)	75.1(2.0)	72.6(1.6)	78.3(1.5)	55.1(4.9)	63.8(7.3)
	1982	72.0(1.3)	75.8(1.6)	68.1(1.7)	75.7(1.6)	57.7(2.3)	54.1(4.1)
	1977	65.6(1.2)	69.1(1.5)	62.2(1.7)	69.6(1.3)	41.3(2.0)	53.0(3.1)
PLATE TECTONICS: EARTHQUAKES	1990	90.3(1.0)	88.9(1.5)	91.5(1.0)	92.7(0.8)	80.7(4.6)	88.4(2.4)
	1986	88.8(0.9)	89.9(1.7)	87.8(1.2)	92.0(0.9)	72.7(3.0)	84.8(6.0)
	1982	89.1(0.9)	89.4(1.3)	88.9(1.1)	91.1(0.9)	78.5(2.4)	84.5(4.5)
	1977	91.2(0.6)	91.9(0.8)	90.6(0.8)	93.3(0.5)	77.8(2.1)	85.1(4.8)
PLATE TECTONICS: CONTINENTS	1990	83.2(1.3)	83.4(1.5)	83.1(1.8)	88.5(0.9)	64.1(3.3)	72.8(4.2)
	1986	80.9(1.3)	82.6(1.8)	79.3(1.5)	85.8(1.4)	61.1(3.9)	64.9(6.1)
	1982	76.7(1.6)	78.7(1.9)	74.7(2.3)	81.2(1.5)	54.5(3.8)	60.9(5.9)
	1977	80.9(1.3)	80.8(1.3)	81.0(1.5)	85.8(0.9)	54.0(3.0)	59.5(3.7)
PLATE TECTONICS: MOON	1990	83.2(1.4)	82.1(1.6)	84.1(1.7)	88.5(1.0)	63.6(3.8)	75.8(4.1)
	1986	81.0(1.6)	81.0(2.4)	81.0(1.4)	85.1(1.3)	61.6(6.8)	76.5(5.5)
	1982	84.1(1.1)	84.1(1.4)	84.1(1.4)	87.6(1.0)	66.6(2.9)	73.7(3.6)
	1977	73.3(1.0)	72.1(1.3)	74.5(1.3)	76.4(1.2)	55.7(2.4)	59.4(3.4)
COMPONENTS OF SOLAR SYSTEM	1990	72.4(1.3)	76.0(1.5)	69.3(1.5)	74.4(1.5)	63.7(2.9)	70.5(3.2)
	1986	72.7(1.8)	79.9(1.7)	65.5(2.6)	75.8(2.0)	57.8(4.3)	68.5(3.4)
	1982	69.7(1.5)	75.2(1.7)	64.5(1.7)	73.2(1.6)	53.3(4.0)	55.3(4.9)
	1977	78.3(0.9)	83.1(1.1)	73.7(1.3)	80.7(1.0)	62.9(2.1)	76.9(3.4)
WEATHER: WIND SPEED	1990	92.9(1.0)	91.5(1.4)	94.2(0.9)	95.4(0.7)	85.7(3.2)	83.0(4.9)
	1986	92.8(1.2)	91.1(1.6)	94.5(1.2)	94.8(0.9)	82.4(5.5)	89.6(2.3)
	1982	84.7(1.2)	85.1(1.3)	84.4(1.7)	87.6(1.1)	68.4(2.5)	79.5(4.4)
	1977	94.0(0.7)	94.7(0.7)	93.2(0.9)	95.3(0.6)	85.7(2.6)	90.6(2.4)
WEATHER: SUNRISE	1990	63.1(1.2)	59.7(1.6)	66.1(1.6)	65.8(1.1)	54.5(4.1)	54.4(3.9)
	1986	61.7(1.3)	62.9(1.7)	60.5(1.9)	63.5(1.4)	51.5(2.6)	54.7(3.8)
	1982	50.7(1.6)	51.3(1.7)	50.1(2.0)	50.3(2.0)	51.9(2.7)	55.1(5.7)
	1977	56.2(1.4)	53.0(1.6)	59.4(1.8)	57.4(1.5)	48.1(3.1)	49.5(4.4)
WEATHER: RAINFALL	1990	84.0(1.5)	84.7(1.7)	83.4(1.7)	88.4(1.0)	73.9(3.7)	67.1(5.9)
	1986	84.9(1.0)	85.9(1.4)	83.9(1.3)	87.8(0.9)	74.3(3.4)	75.7(4.5)
	1982	82.2(1.4)	83.1(1.5)	81.4(1.8)	86.7(1.2)	58.2(2.1)	73.3(8.2)
	1977	89.9(0.7)	90.8(0.9)	89.1(0.8)	92.3(0.6)	75.7(3.1)	84.0(3.1)
WEATHER: HUMIDITY	1990	90.1(0.8)	88.5(1.1)	91.6(1.0)	93.2(0.7)	81.3(3.0)	81.2(3.4)
	1986	90.4(0.8)	88.6(1.0)	92.1(1.0)	92.0(1.0)	83.6(3.0)	82.8(2.4)
	1982	78.5(1.2)	80.9(1.6)	76.3(1.6)	82.1(1.1)	62.8(2.3)	62.9(4.5)
	1977	89.4(0.6)	89.1(0.9)	89.7(0.9)	91.2(0.7)	80.2(1.9)	78.2(3.9)

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Percentage of Students Responding Correctly to Science Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
WEATHER: FIRST DAY OF SPRING	1990	71.0(1.3)	70.4(1.6)	71.5(1.7)	75.6(1.1)	55.4(3.6)	58.4(4.4)
	1986	68.1(1.3)	70.3(1.6)	65.9(1.8)	71.0(1.6)	57.0(5.3)	58.8(4.7)
	1982	62.6(1.4)	64.0(1.9)	61.3(1.8)	64.3(1.6)	57.9(2.3)	52.6(4.5)
	1977	68.2(1.0)	69.1(1.5)	67.4(1.6)	70.7(1.0)	56.4(2.4)	51.5(4.9)
WEATHER: AVERAGE TEMPERATURE	1990	65.6(1.5)	65.8(2.2)	65.4(1.8)	68.5(1.4)	61.1(4.2)	52.7(5.1)
	1986	64.8(1.4)	65.9(1.9)	63.6(1.6)	67.0(1.7)	58.5(3.3)	51.7(2.3)
	1982	62.5(1.2)	65.3(1.0)	59.8(1.9)	65.0(1.4)	48.2(2.8)	54.6(3.5)
	1977	71.8(0.9)	73.3(1.3)	70.3(1.2)	74.0(0.9)	59.8(3.9)	61.2(4.4)
COMMUNICATING ON THE MOON	1990	68.0(1.1)	78.1(1.3)	59.0(1.5)	70.3(1.2)	58.3(3.0)	71.8(4.3)
	1986	69.8(1.3)	78.7(1.3)	60.7(1.9)	71.3(1.3)	62.2(3.4)	66.9(5.1)
	1982	68.0(1.8)	75.8(2.5)	59.8(2.1)	70.5(1.9)	50.2(3.6)	70.9(5.9)
	1977	69.5(1.2)	78.6(1.3)	60.4(1.7)	71.5(1.1)	57.2(3.1)	59.0(8.7)
HALF-LIFE	1990	66.1(1.4)	68.1(1.3)	64.3(2.0)	68.4(1.5)	56.8(4.3)	63.5(2.9)
	1986	66.5(1.5)	68.2(1.9)	64.7(1.8)	67.6(1.4)	60.8(5.9)	66.2(2.9)
	1982	58.8(1.8)	62.8(2.1)	55.2(2.2)	58.8(1.9)	59.3(4.6)	66.0(6.9)
	1977	59.8(1.3)	62.2(1.6)	57.4(1.8)	60.8(1.6)	51.9(2.8)	55.8(5.9)
SPEED OF LIGHT AND SOUND	1990	30.8(1.2)	36.3(1.8)	25.9(1.7)	33.8(1.2)	23.0(3.3)	19.0(3.1)
	1986	30.4(1.7)	38.0(2.8)	22.7(1.3)	33.0(2.1)	16.6(2.5)	21.5(5.8)
	1977	31.1(1.2)	38.1(1.3)	24.3(1.4)	33.9(1.3)	15.8(2.0)	18.2(4.3)
ANGLE OF REFLECTION	1990	58.6(1.2)	70.6(1.6)	47.9(1.7)	61.3(1.3)	51.4(3.5)	47.7(3.6)
	1986	58.1(2.0)	68.4(2.3)	47.8(2.6)	59.6(2.3)	49.6(5.1)	56.6(4.2)
	1982	57.8(1.7)	67.0(2.3)	49.6(2.1)	60.4(2.0)	44.3(3.2)	48.9(2.9)
	1977	55.7(1.1)	66.2(1.4)	45.5(1.5)	57.8(1.3)	43.6(2.4)	48.0(3.0)
EARTH'S CRUST: OLDEST LAYERS	1990	54.2(1.3)	55.0(1.8)	53.5(1.6)	58.1(1.2)	44.0(4.1)	43.2(4.3)
	1986	51.1(2.3)	48.1(2.5)	54.2(2.8)	53.6(2.6)	37.9(4.3)	52.0(3.4)
	1977	47.6(1.4)	45.1(1.7)	50.2(1.8)	49.9(1.5)	32.9(2.3)	46.1(5.6)
EARTH'S CRUST: CURVED LAYERS	1990	48.3(1.3)	55.4(1.8)	42.0(1.7)	50.4(1.3)	39.2(3.3)	47.1(4.6)
	1986	50.8(1.3)	59.3(2.1)	42.2(2.0)	51.0(1.4)	47.6(2.7)	55.1(4.8)
	1977	48.7(1.4)	56.1(1.5)	41.4(1.7)	49.7(1.6)	41.4(2.4)	49.8(3.8)
DISCOVERY: COMPUTERS	1990	70.8(1.3)	74.9(1.6)	67.1(1.9)	72.7(1.3)	63.8(2.9)	68.6(4.8)
	1986	72.5(1.2)	75.9(1.6)	69.0(1.4)	75.0(1.4)	63.5(4.4)	66.2(3.6)
	1982	67.3(1.3)	72.4(1.2)	62.7(2.0)	69.8(1.5)	55.5(2.8)	56.7(4.2)
	1977	69.4(1.4)	76.8(1.5)	61.8(2.0)	70.0(1.6)	63.3(2.9)	72.9(3.6)
DISCOVERY: SPACE	1990	57.1(1.5)	58.5(2.2)	55.8(1.7)	58.3(1.6)	55.6(2.7)	48.8(4.5)
	1986	52.9(1.7)	54.9(2.2)	51.0(2.5)	53.2(1.8)	52.5(3.1)	56.3(5.2)
	1982	46.7(1.7)	47.3(1.9)	46.2(2.3)	47.3(2.0)	43.0(3.0)	51.1(5.2)
	1977	56.6(1.7)	60.1(1.4)	53.0(2.8)	57.9(2.0)	50.8(3.1)	45.3(4.8)
DISCOVERY: PLASTICS	1990	66.8(1.5)	69.7(1.9)	64.2(1.9)	71.4(1.5)	53.7(3.0)	57.8(4.6)
	1986	68.0(1.5)	67.8(1.8)	68.2(2.0)	71.4(1.9)	52.4(3.9)	60.3(4.4)
	1982	68.4(1.5)	70.8(2.1)	66.2(1.9)	71.2(1.6)	54.8(3.1)	61.6(6.0)
	1977	69.0(1.4)	69.7(1.7)	68.3(2.0)	71.9(1.4)	52.9(3.5)	62.8(6.2)
DISCOVERY: LASERS	1990	85.9(1.3)	87.1(1.4)	84.9(1.7)	89.5(1.1)	78.9(3.3)	76.3(3.5)
	1986	86.7(0.8)	87.6(1.7)	85.9(0.9)	90.0(0.9)	72.5(3.3)	82.3(2.6)
	1982	77.6(1.3)	79.9(1.7)	75.6(1.7)	81.4(1.4)	58.0(2.6)	65.3(3.5)
	1977	64.3(1.3)	67.7(2.0)	60.9(1.5)	66.1(1.4)	51.2(3.5)	69.1(4.9)
EFFECT OF CLEARING FORESTS	1990	39.6(1.6)	43.7(2.1)	35.9(1.8)	45.0(1.4)	22.4(3.2)	22.9(4.7)
	1986	46.1(1.5)	52.3(2.5)	39.7(1.8)	50.5(1.7)	27.9(2.3)	34.9(4.7)
	1982	53.0(1.4)	58.6(2.0)	47.6(1.4)	58.9(1.6)	28.2(2.1)	24.7(5.9)
	1977	60.2(1.4)	64.5(1.5)	55.9(1.9)	66.1(1.2)	31.8(3.7)	24.9(7.1)

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Percentage of Students Responding Correctly to Science Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
CAUSE OF SEASONS	1990	26.2(1.4)	30.9(1.7)	21.9(1.6)	27.8(1.5)	20.0(3.2)	22.3(3.3)
	1986	26.5(1.7)	32.9(2.6)	20.0(1.4)	28.3(1.9)	15.7(3.0)	25.5(3.5)
	1977	26.9(0.9)	30.7(1.3)	23.2(1.4)	28.7(1.1)	16.1(1.8)	23.9(5.0)
PRODUCT Z: ARTHRITIS	1990	76.9(1.5)	76.2(1.9)	77.6(1.4)	82.9(1.2)	59.4(4.7)	57.8(5.0)
	1986	76.2(1.3)	76.1(1.8)	76.4(1.5)	81.2(1.4)	58.0(3.1)	60.9(6.9)
	1982	69.4(1.1)	68.1(1.7)	70.8(1.5)	75.4(1.0)	41.3(3.1)	46.5(3.2)
	1977	76.7(1.1)	73.2(1.9)	80.2(1.2)	81.5(1.0)	47.5(3.1)	62.9(4.2)
PRODUCT Z: HARM	1990	88.8(0.9)	87.7(1.2)	89.9(1.2)	91.9(0.7)	76.7(2.9)	83.5(3.6)
	1986	88.6(0.8)	88.2(1.2)	89.0(1.1)	90.3(1.0)	83.0(2.4)	79.3(3.2)
	1982	90.8(0.9)	88.3(1.4)	93.3(1.1)	92.8(0.8)	79.1(3.2)	89.5(2.5)
	1977	87.9(0.9)	86.6(1.4)	89.3(0.8)	90.8(0.8)	70.0(2.8)	82.1(3.5)
PRODUCT Z: PAIN RELLIEF	1990	91.9(0.8)	89.4(1.2)	94.3(0.7)	93.2(0.6)	89.2(1.6)	81.2(6.1)
	1986	93.0(0.6)	91.5(1.0)	94.3(1.1)	94.2(0.6)	90.4(1.6)	81.9(6.2)
	1982	90.9(0.9)	88.5(1.2)	93.3(1.0)	93.3(0.6)	79.7(3.1)	82.6(5.4)
	1977	91.0(0.6)	88.3(0.9)	93.7(0.7)	93.5(0.4)	74.8(2.8)	87.3(2.8)
PRODUCT Z: FEEL BETTER	1990	91.3(0.9)	89.8(0.9)	92.8(1.2)	93.8(0.6)	81.2(2.6)	87.3(4.9)
	1986	90.5(0.7)	88.7(1.3)	92.2(0.9)	92.8(0.8)	82.6(1.9)	79.8(3.9)
	1982	91.4(0.7)	89.4(1.1)	93.5(0.8)	94.2(0.7)	76.8(2.6)	87.5(2.8)
	1977	89.0(0.8)	87.3(1.3)	90.7(0.9)	92.2(0.7)	69.1(2.7)	80.0(2.9)
READING A PRESSURE GAUGE	1990	80.5(1.0)	81.6(1.3)	79.6(1.3)	84.2(0.9)	68.4(2.9)	71.2(4.7)
	1986	80.7(1.1)	83.5(1.5)	77.8(1.5)	84.6(1.1)	62.8(4.5)	72.3(2.9)
	1982	78.9(1.2)	83.1(1.5)	74.6(1.7)	82.2(1.3)	62.4(3.8)	69.4(4.6)
	1977	75.0(0.9)	79.1(1.1)	71.0(1.3)	78.8(0.8)	53.4(3.2)	57.3(3.0)
RAIN AND CORN GROWTH	1990	68.0(1.4)	70.5(2.0)	65.5(1.7)	70.2(1.4)	58.7(4.3)	61.0(7.5)
	1986	66.4(1.2)	68.7(1.7)	64.3(1.9)	69.8(1.2)	53.4(3.5)	53.7(4.6)
	1982	70.3(1.3)	70.3(1.8)	70.3(2.0)	72.9(1.6)	55.5(3.2)	67.4(3.6)
	1977	69.2(1.3)	70.6(1.5)	67.7(1.6)	72.7(1.2)	54.1(3.3)	47.9(4.1)
FOOD SHORTAGE: BIRTH RATE	1990	83.8(0.9)	83.0(1.2)	84.6(1.3)	86.8(1.1)	73.7(3.4)	69.3(3.4)
	1986	84.9(1.2)	84.4(1.6)	85.3(1.6)	88.3(1.1)	73.9(3.7)	68.3(6.2)
	1982	84.3(1.3)	83.6(1.4)	85.1(1.6)	88.6(1.1)	64.6(3.5)	74.1(2.9)
	1977	94.2(0.6)	93.1(0.8)	95.2(0.7)	95.9(0.4)	85.4(2.3)	83.0(2.6)
FOOD SHORTAGE: AMOUNT OF FOOD	1990	93.7(0.9)	91.9(1.3)	95.6(0.9)	96.0(0.7)	84.9(2.7)	87.7(4.0)
	1986	95.7(0.5)	95.4(0.9)	95.9(0.7)	96.8(C.5)	90.9(1.5)	94.0(1.8)
	1982	92.0(1.2)	92.2(1.1)	91.8(1.6)	94.3(1.3)	79.8(2.9)	92.1(1.8)
	1977	97.6(0.3)	97.0(0.4)	98.1(0.4)	98.6(0.2)	92.2(1.4)	93.4(2.0)
FOOD SHORTAGE: MARKETS	1990	68.0(1.4)	68.9(1.6)	67.0(1.7)	71.3(1.5)	57.6(4.1)	51.8(3.8)
	1986	74.8(1.2)	75.4(1.8)	74.2(1.6)	79.9(1.2)	58.0(3.1)	51.0(6.6)
	1982	71.2(1.1)	72.6(1.4)	69.9(1.4)	76.0(1.0)	48.0(3.7)	54.7(3.6)
	1977	78.2(1.1)	79.4(1.4)	77.0(1.3)	82.1(1.1)	55.6(3.0)	61.9(4.6)
FOOD SHORTAGE: WEATHER	1990	71.8(1.2)	72.3(1.8)	71.3(1.4)	76.1(1.4)	58.7(2.5)	55.1(6.0)
	1986	73.5(1.4)	72.3(1.9)	74.5(1.9)	77.2(1.4)	60.4(3.3)	57.7(4.8)
	1982	61.8(1.2)	62.1(1.6)	61.5(1.9)	66.1(1.2)	39.6(2.9)	49.3(4.5)
	1977	77.2(0.7)	77.2(1.4)	77.1(1.3)	79.8(0.8)	61.0(2.8)	74.8(3.6)
VOLUME EQUATION	1990	84.2(1.3)	81.4(1.9)	86.8(1.4)	87.6(1.1)	73.8(4.2)	76.4(7.4)
	1986	83.2(1.2)	81.6(2.1)	84.7(1.3)	87.1(1.1)	69.2(4.2)	69.7(3.7)
	1982	75.0(1.3)	73.5(1.6)	76.5(1.7)	79.5(1.4)	57.3(3.6)	51.1(4.1)
	1977	68.2(1.5)	65.4(1.9)	70.9(1.7)	73.1(1.3)	40.9(3.1)	41.9(4.1)
MEANING OF 20% CHANCE OF RAIN	1990	31.8(1.6)	34.7(1.8)	29.3(2.1)	37.2(1.7)	18.2(2.8)	15.9(3.3)
	1986	30.1(1.9)	36.2(2.6)	24.1(1.9)	34.1(2.1)	18.4(3.6)	11.3(3.4)
	1982	28.5(1.4)	34.3(2.5)	23.0(1.5)	31.6(1.6)	13.8(2.0)	18.9(5.1)
	1977	28.7(1.6)	33.2(1.9)	24.1(1.7)	31.0(1.6)	14.7(2.4)	20.0(5.7)

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Percentage of Students Responding Correctly to Science Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
POISONS IN FOOD CHAINS	1990	80.1(1.4)	81.3(1.8)	79.1(1.6)	85.1(0.8)	64.3(3.8)	73.5(4.6)
	1986	78.1(1.9)	81.6(2.5)	74.5(2.1)	82.5(2.2)	58.5(3.3)	67.3(4.8)
	1977	77.0(1.3)	76.4(1.3)	77.5(1.8)	79.2(1.3)	63.0(4.2)	72.4(4.3)
INHERITED/LEARNED: SMILING	1990	51.4(1.6)	52.2(2.2)	50.7(2.2)	50.6(1.9)	54.0(3.8)	56.0(3.8)
	1986	51.5(1.5)	57.0(2.2)	46.1(2.3)	47.4(1.7)	68.3(3.9)	65.9(4.9)
	1977	44.9(1.1)	48.1(1.9)	41.6(1.4)	42.5(1.2)	55.6(3.9)	57.4(4.9)
INHERITED/LEARNED: SWIMMING	1990	97.1(0.5)	95.8(1.0)	98.3(0.4)	98.3(0.3)	95.5(1.2)	88.4(3.7)
	1986	97.6(0.5)	96.4(0.9)	98.9(0.4)	97.5(0.6)	97.9(0.5)	98.9(0.9)
	1977	98.2(0.3)	97.6(0.5)	98.8(0.3)	98.1(0.3)	99.0(0.4)	96.3(2.1)
INHERITED/LEARNED: WRITING	1990	92.1(0.8)	90.5(1.1)	93.4(0.9)	92.4(0.9)	89.6(1.8)	91.3(2.9)
	1986	93.4(0.8)	93.8(0.9)	93.0(1.1)	93.6(0.9)	93.1(1.1)	94.1(1.9)
	1977	93.0(0.6)	93.4(0.7)	92.6(0.9)	93.4(0.7)	89.3(2.2)	94.1(2.6)
INHERITED/LEARNED: BREATHING	1990	82.3(0.9)	83.4(1.3)	81.3(1.4)	83.9(0.8)	76.4(3.4)	81.4(3.0)
	1986	82.8(1.3)	84.0(1.9)	81.6(1.4)	84.7(1.5)	73.5(2.5)	82.1(3.4)
	1977	84.8(1.0)	85.4(1.2)	84.1(1.3)	85.3(1.2)	80.8(2.0)	84.0(4.8)
WHY PUBLISH? SHARE FINDINGS	1990	79.4(1.1)	77.2(1.6)	81.4(1.2)	81.7(1.3)	72.2(3.2)	70.0(3.7)
	1986	79.9(1.0)	79.8(1.7)	80.1(1.2)	81.7(1.0)	74.3(4.8)	69.3(3.2)
	1977	76.9(1.5)	75.7(1.6)	78.2(2.0)	77.8(1.5)	71.8(2.8)	74.1(4.4)
WHY PUBLISH? CHECK FINDINGS	1990	76.0(1.1)	74.3(1.3)	77.4(1.4)	78.5(1.2)	67.5(4.6)	68.7(4.2)
	1986	74.1(1.4)	71.2(1.7)	77.1(1.8)	75.4(1.6)	68.8(2.9)	74.5(4.6)
	1977	79.8(1.0)	77.5(1.6)	82.2(1.1)	80.4(1.0)	77.8(2.2)	79.1(4.6)
WHY PUBLISH? ADD TO KNOWLEDGE	1990	82.9(1.1)	82.2(1.2)	83.5(1.5)	85.0(0.9)	74.4(4.0)	82.7(3.6)
	1986	84.6(1.0)	84.1(1.7)	85.2(1.2)	85.5(1.0)	84.0(2.6)	77.8(3.9)
	1977	85.1(0.7)	83.8(1.0)	86.4(0.9)	86.1(0.8)	81.3(2.0)	80.2(3.2)
OCEAN CURRENTS AND CLIMATE	1990	31.6(1.4)	36.5(2.1)	27.2(1.4)	36.4(1.4)	15.5(2.6)	22.6(3.1)
	1986	27.8(1.6)	31.3(2.5)	24.4(1.7)	31.1(1.9)	16.5(2.4)	12.2(1.9)
	1977	42.0(1.6)	50.0(2.0)	34.6(1.6)	45.3(1.6)	21.9(1.8)	26.3(3.7)
ENERGY CONTENT OF FOODS	1990	6.2(0.7)	7.2(1.0)	5.3(0.8)	6.2(0.8)	8.7(1.7)	1.4(0.9)
	1986	5.4(0.7)	6.6(1.0)	6.2(0.8)	5.8(0.8)	8.0(2.3)	8.3(2.8)
	1977	4.4(0.5)	5.3(0.8)	3.6(0.5)	4.0(0.5)	6.4(1.1)	7.6(3.3)
HEATING A COPPER WIRE	1990	65.4(1.0)	69.2(1.2)	62.1(1.6)	66.5(1.2)	62.2(3.3)	64.3(2.6)
	1986	66.0(1.1)	68.7(1.4)	63.2(2.0)	67.7(1.3)	59.0(3.5)	59.1(4.4)
	1982	67.9(1.9)	68.5(2.2)	67.3(2.6)	68.0(2.2)	69.4(3.0)	63.6(3.4)
	1977	69.3(1.0)	71.8(1.3)	66.9(1.4)	70.2(1.2)	64.3(2.2)	67.7(4.6)
VOLTAGE BETWEEN TWO POINTS	1990	66.3(1.4)	67.8(1.6)	65.0(1.7)	71.1(1.2)	51.4(1.9)	57.1(5.0)
	1986	66.7(1.2)	68.3(1.5)	65.1(2.1)	70.6(1.5)	48.6(3.0)	61.6(4.5)
	1982	66.1(1.5)	67.1(2.1)	65.2(1.6)	68.5(1.6)	53.9(3.0)	64.8(8.1)
	1977	61.4(1.0)	63.1(1.4)	59.7(1.6)	63.4(1.2)	46.3(2.5)	58.8(6.8)
RELATIVE MOVEMENT: BOY-BIKE	1990	22.4(1.1)	27.8(1.6)	17.5(1.2)	25.0(1.2)	11.4(2.3)	16.1(3.1)
	1986	21.6(2.0)	28.3(3.5)	14.8(1.5)	24.0(2.4)	13.4(2.5)	9.5(2.8)
	1977	25.7(1.2)	29.7(1.5)	21.8(1.5)	28.4(1.3)	10.0(2.0)	11.8(2.7)
RELATIVE MOVEMENT: BOY-CAR	1990	90.9(1.0)	91.9(1.3)	90.0(1.2)	93.1(0.8)	83.5(2.9)	85.5(3.2)
	1986	93.0(0.8)	94.0(0.8)	91.9(1.2)	93.8(0.8)	89.3(2.9)	91.7(2.6)
	1977	92.2(0.6)	93.4(0.7)	91.1(1.0)	93.3(0.6)	84.1(2.5)	92.1(3.2)
RELATIVE MOVEMENT: CAR-BIKE	1990	49.1(1.2)	53.3(1.4)	45.5(1.7)	52.1(1.2)	36.8(2.5)	48.2(5.8)
	1986	48.2(1.6)	53.7(2.5)	42.7(2.0)	51.7(2.1)	34.2(3.1)	34.1(5.1)
	1977	60.7(1.0)	61.9(1.4)	59.4(1.4)	63.7(1.0)	43.3(2.5)	45.3(4.6)

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Percentage of Students Responding Correctly to Science Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
RELATIVE MOVEMENT: BOY-TREE	1990	89.9(0.8)	91.1(1.0)	88.9(1.1)	91.2(0.9)	85.8(2.2)	85.3(4.4)
	1986	90.6(0.7)	91.9(0.9)	89.3(1.1)	91.5(0.8)	85.7(2.3)	92.4(1.9)
	1977	90.0(0.7)	90.4(0.9)	89.7(0.8)	90.8(0.7)	83.8(1.9)	90.8(4.1)
TEMPERATURE AFFECTS PRESSURE	1990	43.0(1.5)	53.3(1.9)	33.8(1.9)	48.6(1.5)	26.2(2.9)	25.0(3.2)
	1986	43.5(1.6)	57.9(2.3)	29.0(1.5)	47.7(1.5)	25.7(4.3)	31.1(3.7)
	1977	45.1(1.5)	58.5(1.7)	32.7(1.8)	49.1(1.4)	19.6(2.0)	33.1(5.6)
BEAM OF ELECTRONS IN TV SCREEN	1990	37.1(1.1)	39.4(1.6)	35.0(1.6)	38.3(1.1)	34.3(3.3)	29.9(2.4)
	1986	33.7(1.2)	37.0(1.9)	30.3(1.3)	35.7(1.4)	23.9(3.5)	28.4(6.1)
	1977	34.2(1.2)	39.3(1.8)	29.5(1.4)	34.4(1.3)	33.2(3.3)	31.9(4.3)
ACCELERATION OF WAGON ON HILL	1990	28.3(1.3)	35.3(1.6)	22.2(1.5)	32.6(1.5)	11.9(2.1)	20.5(4.2)
	1986	28.6(1.6)	38.0(2.9)	19.2(1.3)	32.2(1.7)	13.3(3.0)	17.2(2.5)
	1977	26.0(1.1)	35.8(1.3)	16.3(1.3)	29.1(1.1)	9.2(1.7)	13.6(2.8)
LIGHT BULBS IN SERIES	1990	28.3(1.4)	35.5(1.7)	22.0(1.5)	31.8(1.5)	14.5(2.1)	24.4(3.9)
	1986	24.5(1.3)	32.2(1.9)	16.9(1.3)	26.7(1.3)	15.6(3.6)	19.7(3.2)
	1977	25.4(1.1)	32.0(1.6)	19.0(1.3)	27.8(1.2)	11.2(2.1)	19.3(4.0)
INTERPRET A CHEMICAL FORMULA	1990	57.4(1.3)	58.6(1.7)	56.3(1.8)	60.1(1.3)	53.8(2.8)	39.8(6.6)
	1986	56.3(1.4)	57.9(2.2)	54.9(1.7)	59.7(1.6)	46.2(3.6)	42.9(5.4)
	1977	44.6(1.7)	46.8(2.3)	42.6(1.7)	47.6(1.7)	28.3(4.1)	32.8(4.8)
ANALYZING CAUSES OF DISEASE	1990	54.6(1.6)	53.9(2.2)	55.2(1.6)	57.7(1.9)	40.3(3.6)	49.2(5.4)
	1986	55.7(1.6)	54.9(2.5)	56.5(2.1)	59.7(1.9)	38.3(3.0)	48.6(3.7)
	1977	56.0(1.2)	54.5(1.7)	57.4(1.2)	59.3(1.3)	34.5(2.3)	41.2(4.7)
NEUTRALIZE ALKALI	1990	10.1(0.8)	11.1(1.1)	9.1(0.9)	10.1(0.8)	9.1(1.8)	7.6(4.2)
	1986	10.6(1.0)	11.5(1.6)	9.9(1.0)	11.1(1.0)	7.7(1.8)	8.9(2.8)
	1977	9.9(0.9)	10.2(1.3)	9.6(1.1)	9.7(1.0)	10.7(1.6)	8.1(3.1)
RATIO OF OXYGEN/COPPER	1990	47.3(1.9)	47.6(2.3)	46.9(2.1)	49.6(1.9)	37.1(6.1)	36.6(8.1)
	1986	43.2(1.9)	42.6(2.3)	43.8(2.4)	46.9(2.3)	30.8(4.3)	25.2(5.3)
	1977	37.1(1.8)	39.2(2.4)	35.1(1.7)	39.4(1.6)	22.2(3.9)	24.4(5.8)
PLANT EXPERIMENT: CONCLUSION	1990	28.8(1.4)	29.7(2.1)	27.9(1.6)	32.5(1.5)	18.0(2.4)	10.1(3.8)
	1986	31.5(1.8)	31.1(2.4)	31.8(2.2)	35.6(2.0)	17.0(3.3)	14.2(3.1)
	1977	28.7(1.2)	28.3(1.7)	29.0(1.5)	31.3(1.3)	14.0(2.4)	17.1(2.8)
PLANT EXPERIMENT: CONTROL	1990	79.2(1.2)	74.4(1.7)	84.1(1.3)	81.8(1.0)	70.3(2.8)	68.7(6.5)
	1986	77.9(1.5)	74.0(2.2)	81.4(1.7)	81.7(1.5)	62.2(3.6)	72.0(3.6)
	1977	77.9(1.1)	75.2(1.6)	80.3(1.7)	79.7(1.3)	67.1(2.8)	71.9(4.2)
FORMATION OF CHEMICAL PRODUCT	1990	36.3(1.5)	39.0(2.1)	33.5(1.8)	39.6(1.4)	22.4(4.7)	28.1(5.4)
	1986	34.2(1.3)	34.2(2.1)	34.2(1.8)	38.4(1.4)	15.9(2.3)	17.6(3.9)
	1977	32.3(1.2)	34.8(1.7)	30.1(1.4)	35.5(1.2)	12.6(2.7)	18.4(4.1)
ENERGY ADDED TO MELTING ICE	1990	31.2(1.5)	33.5(2.0)	28.9(1.8)	33.4(1.6)	23.5(2.8)	19.9(6.6)
	1986	29.7(1.3)	31.8(1.7)	27.8(1.7)	30.8(1.5)	23.4(2.7)	28.8(3.5)
	1977	30.7(1.2)	33.0(1.4)	28.4(1.4)	32.4(1.2)	18.8(2.4)	29.3(6.4)
BALANCING A CHEMICAL EQUATION	1990	45.0(1.8)	43.4(2.3)	46.6(2.2)	47.7(1.7)	35.5(7.1)	29.9(6.0)
	1986	40.3(2.4)	40.5(3.1)	40.1(2.6)	43.6(2.7)	26.9(2.9)	23.3(4.5)
	1977	32.6(1.6)	33.3(1.7)	31.8(2.3)	35.9(1.7)	13.4(2.3)	19.6(5.8)
ESTIMATE HALF-LIFE FROM GRAPH	1990	34.1(1.8)	38.3(2.1)	29.9(1.9)	36.7(1.8)	26.8(4.6)	16.2(4.4)
	1986	32.8(1.1)	36.2(1.6)	29.6(1.6)	34.5(1.3)	25.1(3.5)	30.5(3.8)
	1977	26.4(1.2)	31.0(1.7)	22.1(1.2)	28.8(1.2)	13.0(1.5)	14.8(2.6)
EQUILIBRIUM REACTION	1990	24.6(1.4)	26.9(2.0)	22.3(1.4)	25.6(1.3)	23.1(3.4)	10.5(3.1)
	1986	28.7(1.4)	31.3(2.2)	26.4(1.7)	29.5(1.6)	24.7(2.8)	26.8(4.4)
	1977	30.6(1.3)	30.1(1.9)	31.0(1.6)	30.8(1.5)	33.4(3.1)	19.9(4.3)

DATA APPENDIX

MATHEMATICS

NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 9

Average Mathematics Proficiency Across Assessment Years

	1977-78	1981-82	1985-86	1989-90	DIFFERENCE 1978-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	218.6(0.8)	219.0(1.1)	221.7(1.0)	229.6(0.8)	11.0(1.2)	10.7(1.4)	7.9(1.3)
SEX							
MALE	217.4(0.7)	217.1(1.2)	221.7(1.1)	229.1(0.9)	11.7(1.2)	12.0(1.5)	7.4(1.4)
FEMALE	219.9(1.0)	220.8(1.2)	221.7(1.2)	230.2(1.1)	10.2(1.5)	9.4(1.6)	8.4(1.6)
RACE/ETHNICITY							
WHITE	224.1(0.9)	224.0(1.1)	226.9(1.1)	235.2(0.8)	11.1(1.2)	11.2(1.4)	8.3(1.4)
BLACK	192.4(1.1)	194.9(1.6)	201.6(1.6)	208.4(2.2)	15.9(2.5)	13.4(2.8)	6.8(2.8)
HISPANIC	202.9(2.2)	204.0(1.3)	205.4(2.1)	213.8(2.1)	10.8(3.1)	9.7(2.5)	8.3(2.9)
OTHER	227.2(3.4)	238.5(3.4)	221.8(7.5)	235.2(3.2)	8.0(4.7)	-3.3(4.7)	13.4(8.2)
REGION							
NORTHEAST	226.9(1.9)	225.7(1.8)	226.0(2.7)	235.8(2.1)	8.9(2.8)	10.2(2.7)	9.9(3.4)
SOUTHEAST	208.9(1.2)	210.4(2.5)	217.8(2.5)	223.9(2.4)	15.1(2.7)	13.6(3.5)	6.1(3.5)
CENTRAL	224.0(1.5)	221.1(2.7)	226.0(2.3)	230.7(1.3)	6.7(2.0)	9.6(3.0)	4.7(2.6)
WEST	213.5(1.3)	219.3(1.8)	217.2(2.4)	228.5(1.8)	15.0(2.2)	9.2(2.5)	11.3(3.0)
TYPE OF COMMUNITY							
EXTREME RURAL	212.3(2.9)	210.9(2.6)	218.8(7.0)	230.5(3.2)	18.2(4.3)	19.5(4.1)	11.6(7.7)
DISADVANTAGED URBAN	198.7(2.9)	198.8(2.2)	204.2(1.9)	214.4(4.6)	15.7(5.5)	15.6(5.2)	10.2(5.0)
ADVANTAGED URBAN	237.3(1.8)	238.9(2.2)	238.5(2.7)	244.1(1.8)	6.7(2.6)	5.2(2.9)	5.6(3.3)
OTHER	218.4(0.7)	219.3(0.9)	219.4(1.3)	229.0(0.9)	10.7(1.2)	9.7(1.3)	9.6(1.6)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	200.3(1.5)	199.0(1.7)	200.6(2.5)	210.4(2.3)	10.0(2.8)	11.4(2.9)	9.7(3.4)
GRADUATED H.S.	219.2(1.1)	218.3(1.1)	218.4(1.6)	226.2(1.2)	7.0(1.6)	7.8(1.6)	7.8(2.0)
SOME EDUC AFTER H.S.	230.1(1.7)	225.2(2.1)	228.6(2.1)	235.8(2.0)	5.8(2.7)	10.7(3.0)	7.3(2.9)
GRADUATED COLLEGE	231.3(1.1)	228.8(1.5)	231.3(1.1)	237.6(1.3)	6.2(1.7)	8.8(2.0)	6.2(1.7)
UNKNOWN	211.4(1.1)	212.6(1.5)	214.3(1.4)	223.0(1.0)	11.6(1.5)	10.4(1.8)	8.7(1.7)
TYPE OF SCHOOL							
PUBLIC	217.2(0.8)	217.0(1.1)	220.1(1.2)	228.6(0.9)	11.4(1.2)	11.6(1.4)	8.5(1.5)
PRIVATE	230.5(1.7)	231.8(2.1)	230.0(2.5)	238.1(2.3)	7.6(2.9)	6.3(3.1)	8.1(3.4)
QUARTILES							
UPPER	256.0(0.8)	256.0(0.6)	259.3(0.7)	265.6(0.8)	9.6(1.1)	9.6(1.0)	6.3(1.1)
MIDDLE TWO	220.5(0.5)	220.7(0.5)	223.3(0.5)	231.3(0.4)	10.8(0.6)	10.6(0.6)	8.0(0.7)
LOWER	177.6(0.6)	178.5(0.8)	180.9(0.7)	190.3(1.0)	12.7(1.2)	11.8(1.3)	9.4(1.3)

NOTE: Some mathematics trend data for 1973 extrapolated from previous analyses can be found in Chapter Four.

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NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 13

Average Mathematics Proficiency Across Assessment Years

	1977-78	1981-82	1985-86	1989-90	DIFFERENCE 1978-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	264.1(1.1)	268.6(1.1)	269.0(1.2)	270.4(0.9)	6.3(1.4)	1.8(1.4)	1.4(1.5)
SEX							
MALE	263.6(1.3)	269.2(1.4)	270.0(1.1)	271.2(1.2)	7.6(1.8)	1.9(1.8)	1.1(1.7)
FEMALE	264.7(1.1)	268.0(1.1)	267.9(1.5)	269.6(0.9)	5.0(1.4)	1.6(1.4)	1.7(1.7)
RACE/ETHNICITY							
WHITE	271.6(0.8)	274.4(1.0)	273.6(1.3)	276.3(1.1)	4.8(1.3)	1.9(1.4)	2.8(1.6)
BLACK	229.6(1.9)	240.4(1.6)	249.2(2.3)	249.1(2.3)	19.5(3.0)	8.7(2.8)	-0.1(3.2)
HISPANIC	238.0(2.0)	252.4(1.7)	254.3(2.9)	254.6(1.8)	16.6(2.7)	2.1(2.4)	0.3(3.4)
OTHER	272.5(3.5)	274.5(4.1)	282.7(3.4)	273.5(7.2)	1.0(8.0)	-1.0(8.3)	-9.2(8.0)
REGION							
NORTHEAST	272.7(2.4)	276.9(2.0)	276.6(2.2)	274.7(2.3)	2.1(3.4)	-2.2(3.1)	-1.9(3.2)
SOUTHEAST	252.7(3.3)	258.1(2.2)	263.5(1.4)	265.7(1.9)	13.0(3.8)	7.6(2.9)	2.2(2.4)
CENTRAL	269.4(1.8)	272.8(2.1)	266.1(4.5)	272.2(2.4)	2.9(3.0)	-0.5(3.2)	6.2(5.1)
WEST	260.0(1.9)	266.0(2.4)	270.4(2.1)	269.1(1.6)	9.0(2.5)	3.0(2.8)	-1.3(2.6)
TYPE OF COMMUNITY							
EXTREME RURAL	254.5(3.4)	258.2(1.9)	270.1(6.9)	264.9(3.7)	10.4(5.0)	6.6(4.2)	-5.2(7.8)
DISADVANTAGED URBAN	233.3(4.2)	246.2(4.4)	247.8(3.0)	253.3(2.9)	20.0(5.1)	7.1(5.3)	5.5(4.2)
ADVANTAGED URBAN	284.8(1.6)	291.2(1.5)	285.6(0.9)	282.9(2.4)	-1.8(2.8)	-8.3(2.8)	-2.6(2.5)
OTHER	265.7(1.2)	269.3(1.0)	268.9(1.1)	272.1(1.1)	6.4(1.6)	2.8(1.5)	3.3(1.6)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	244.7(1.2)	251.0(1.4)	252.3(2.3)	253.4(1.8)	8.7(2.1)	2.4(2.2)	1.0(2.9)
GRADUATED H.S.	263.1(1.0)	262.9(0.8)	262.7(1.2)	262.6(1.2)	-0.5(1.5)	-0.3(1.4)	-0.1(1.7)
SOME EDUC AFTER H.S.	273.1(1.2)	275.1(0.9)	273.7(0.8)	277.1(1.0)	4.0(1.6)	2.1(1.4)	3.5(1.3)
GRADUATED COLLEGE	283.8(1.2)	282.3(1.5)	279.9(1.4)	280.4(1.0)	-3.4(1.6)	-1.9(1.8)	0.5(1.8)
UNKNOWN	239.5(1.3)	251.9(3.2)	247.4(2.3)	247.8(2.1)	8.3(2.5)	-4.0(3.8)	0.5(3.1)
TYPE OF SCHOOL							
PUBLIC	262.6(1.2)	267.1(1.3)	268.7(1.2)	269.3(1.0)	6.7(1.5)	2.2(1.6)	0.6(1.6)
PRIVATE	279.2(1.4)	281.1(2.1)	275.7(4.9)	279.9(1.7)	0.7(2.2)	-1.1(2.7)	4.3(5.2)
QUARTILES							
UPPER	305.0(0.6)	305.6(0.7)	305.7(0.7)	306.5(0.6)	1.5(0.9)	0.9(1.0)	0.8(1.0)
MIDDLE TWO	265.5(0.4)	269.3(0.3)	268.6(0.5)	270.7(0.4)	5.2(0.6)	1.3(0.5)	2.0(0.7)
LOWER	220.6(0.7)	230.3(0.8)	232.9(0.7)	233.7(0.8)	13.1(1.1)	3.4(1.1)	0.8(1.1)

NOTE: Some mathematics trend data for 1973 extrapolated from previous analyses can be found in Chapter Four.

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Average Mathematics Proficiency Across Assessment Years

	1977-78	1981-82	1985-86	1989-90	DIFFERENCE 1978-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	300.4(1.0)	298.5(0.9)	302.0(0.9)	304.6(0.9)	4.2(1.3)	6.1(1.3)	2.6(1.3)
SEX							
MALE	303.8(1.0)	301.5(1.0)	304.7(1.2)	306.3(1.1)	2.5(1.5)	4.8(1.5)	1.6(1.6)
FEMALE	297.1(1.0)	295.6(1.0)	299.4(1.0)	302.9(1.1)	5.8(1.5)	7.3(1.5)	3.6(1.5)
RACE/ETHNICITY							
WHITE	305.9(0.9)	303.7(0.9)	307.5(1.0)	309.5(1.0)	3.6(1.3)	5.8(1.3)	2.0(1.4)
BLACK	268.4(1.3)	271.8(1.2)	278.6(2.1)	288.5(2.8)	20.2(3.1)	16.7(3.1)	9.9(3.5)
HISPANIC	276.3(2.3)	276.7(1.8)	283.1(2.9)	283.5(2.9)	7.2(3.7)	6.8(3.4)	0.4(4.1)
OTHER	312.9(3.3)	309.4(4.5)	304.7(7.2)	312.5(5.2)	-0.4(6.1)	3.1(6.8)	7.8(8.9)
REGION							
NORTHEAST	306.7(1.8)	304.0(2.0)	307.4(1.9)	303.8(2.1)	-2.9(2.8)	-0.2(2.9)	-3.6(2.9)
SOUTHEAST	292.3(1.7)	292.3(2.1)	297.3(1.4)	301.0(2.3)	8.7(2.8)	8.7(3.1)	3.7(2.7)
CENTRAL	305.2(1.9)	302.0(1.4)	303.6(1.9)	311.2(2.1)	6.0(2.9)	9.1(2.5)	7.6(2.8)
WEST	295.5(1.8)	294.1(1.9)	299.3(2.7)	302.1(1.5)	6.6(2.3)	7.9(2.4)	2.7(3.1)
TYPE OF COMMUNITY							
EXTREME RURAL	295.2(1.5)	293.3(2.0)	304.7(5.2)	303.8(1.8)	8.5(2.3)	10.5(2.7)	-0.9(5.5)
DISADVANTAGED URBAN	272.5(1.7)	277.6(2.4)	272.6(2.0)	284.8(4.2)	12.3(4.6)	7.2(4.9)	12.2(4.7)
ADVANTAGED URBAN	320.5(2.0)	318.1(2.7)	316.7(3.4)	317.1(4.4)	-3.4(4.8)	-1.0(5.1)	0.3(5.5)
OTHER	300.6(1.1)	298.5(1.0)	301.8(1.1)	305.5(1.1)	4.9(1.5)	6.9(1.4)	3.7(1.5)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	279.6(1.2)	279.1(1.0)	279.3(2.3)	285.4(2.2)	5.7(2.5)	6.2(2.4)	6.1(3.2)
GRADUATED H.S.	293.9(0.8)	293.8(0.8)	293.1(1.0)	293.7(0.9)	-0.2(1.3)	-0.1(1.2)	0.6(1.4)
SOME EDUC AFTER H.S.	305.3(0.9)	303.9(0.9)	305.2(1.2)	307.7(1.0)	2.4(1.3)	3.8(1.3)	2.5(1.5)
GRADUATED COLLEGE	316.8(1.0)	310.2(1.1)	313.9(1.4)	316.2(1.3)	-0.5(1.7)	6.1(1.7)	2.4(2.0)
UNKNOWN	275.7(1.9)	271.8(2.0)	280.6(2.4)	276.8(2.8)	1.0(3.4)	5.0(3.4)	-3.8(3.7)
TYPE OF SCHOOL							
PUBLIC	299.6(1.0)	297.3(0.9)	301.2(1.0)	303.5(0.8)	4.0(1.3)	6.2(1.2)	2.3(1.3)
PRIVATE	314.3(3.2)	311.4(1.7)	320.1(9.8)	317.7(6.6)	3.4(7.3)	6.3(6.8)	-2.4(11.8)
QUARTILES							
UPPER	338.5(0.4)	336.1(0.6)	339.8(0.7)	341.1(0.8)	2.6(0.9)	4.9(1.0)	1.3(1.1)
MIDDLE TWO	301.7(0.3)	298.8(0.3)	301.4(0.5)	304.7(0.5)	3.0(0.6)	5.9(0.6)	3.3(0.7)
LOWER	259.6(0.5)	260.2(0.7)	265.2(0.9)	267.5(0.9)	7.9(1.1)	7.3(1.1)	2.3(1.3)

NOTE: Some mathematics trend data for 1973 extrapolated from previous analyses can be found in Chapter Four.

NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 9

Percentage of Students with Mathematics Proficiency At or Above Anchor Level 150

	1977-78	1981-82	1985-86	1989-90	DIFFERENCE 1978-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	96.7(0.3)	97.1(0.3)	97.9(0.3)	99.1(0.2)	2.4(0.3)	2.0(0.4)	1.2(0.4)
SEX							
MALE	96.2(0.5)	96.5(0.5)	98.0(0.5)	99.0(0.3)	2.9(0.5)	2.5(0.6)	1.0(0.6)
FEMALE	97.2(0.3)	97.6(0.3)	97.8(0.4)	99.1(0.3)	1.9(0.4)	1.5(0.4)	1.4(0.5)
RACE/ETHNICITY							
WHITE	98.3(0.2)	98.5(0.3)	98.8(0.2)	99.6(0.2)	1.3(0.2)	1.1(0.3)	0.8(0.3)
BLACK	88.4(1.0)	90.2(1.0)	93.9(1.4)	96.9(0.9)	8.4(1.3)	6.7(1.3)	3.0(1.6)
HISPANIC	93.0(1.2)	94.3(1.2)	96.4(1.3)	98.0(0.8)	4.9(1.4)	3.6(1.4)	1.6(1.5)
OTHER	98.1(1.6)	99.2(0.5)	97.4(2.2)	99.2(0.8)	1.2(1.8)	0.0(1.0)	1.9(2.3)
REGION							
NORTHEAST	97.9(0.4)	98.3(0.4)	98.4(0.5)	99.3(0.3)	1.5(0.5)	1.0(0.5)	1.0(0.6)
SOUTHEAST	94.0(0.6)	94.6(0.8)	97.1(0.7)	98.2(0.7)	4.2(0.9)	3.6(1.1)	1.1(1.0)
CENTRAL	98.2(0.3)	97.9(0.5)	98.5(0.5)	99.4(0.3)	1.2(0.4)	1.5(0.6)	0.9(0.6)
WEST	96.2(0.6)	97.5(0.6)	97.5(0.9)	99.3(0.3)	3.1(0.6)	1.8(0.6)	1.8(0.9)
TYPE OF COMMUNITY							
EXTREME RURAL	94.5(1.6)	95.3(1.3)	96.7(2.0)	99.3(0.5)	4.8(1.6)	4.0(1.4)	2.6(2.1)
DISADVANTAGED URBAN	91.4(1.4)	91.8(1.5)	94.3(1.4)	97.4(1.5)	6.0(2.1)	5.6(2.1)	3.1(2.1)
ADVANTAGED URBAN	99.5(0.4)	99.6(0.4)	99.6(0.3)	99.9(0.2)	0.4(0.4)	0.3(0.4)	0.3(0.3)
OTHER	97.0(0.3)	97.5(0.4)	97.8(0.4)	99.1(0.2)	2.1(0.4)	1.6(0.4)	1.3(0.4)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	92.2(1.1)	90.9(1.6)	93.9(1.8)	97.9(1.2)	5.6(1.6)	7.0(2.0)	3.9(2.1)
GRADUATED H.S.	97.1(0.4)	97.6(0.4)	97.4(0.5)	98.7(0.4)	1.6(0.6)	1.1(0.6)	1.2(0.6)
SOME EDUC AFTER H.S.	98.5(0.6)	98.2(0.6)	98.9(1.0)	99.1(0.6)	0.7(0.8)	0.9(0.8)	0.3(1.2)
GRADUATED COLLEGE	98.8(0.3)	98.6(0.3)	99.0(0.3)	99.5(0.3)	0.7(0.4)	0.8(0.4)	0.5(0.4)
UNKNOWN	95.6(0.5)	96.3(0.5)	97.4(0.6)	99.0(0.3)	3.4(0.6)	2.6(0.6)	1.6(0.7)
TYPE OF SCHOOL							
PUBLIC	96.4(0.3)	96.8(0.4)	97.7(0.3)	99.0(0.2)	2.6(0.4)	2.2(0.4)	1.3(0.4)
PRIVATE	99.0(1.0)	99.0(0.4)	98.7(0.8)	99.7(0.3)	0.7(1.0)	0.6(0.5)	1.0(0.8)
QUARTILES							
UPPER	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
MIDDLE TWO	99.9(0.1)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.1(0.1)	0.0(0.0)	0.0(0.0)
LOWER	86.9(0.9)	88.4(1.2)	91.6(1.1)	96.3(0.8)	9.4(1.2)	7.8(1.4)	4.6(1.4)

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Percentage of Students with Mathematics Proficiency At or Above Anchor Level 200

	1977-78	1981-82	1985-86	1989-90	DIFFERENCE 1978-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	70.4(0.9)	71.4(1.2)	74.1(1.2)	81.5(1.0)	11.0(1.3)	10.0(1.5)	7.3(1.6)
SEX							
MALE	68.9(1.0)	68.8(1.3)	74.0(1.4)	80.6(1.0)	11.7(1.4)	11.8(1.7)	6.6(1.8)
FEMALE	72.0(1.1)	74.0(1.3)	74.3(1.3)	82.3(1.3)	10.4(1.6)	8.3(1.8)	8.1(1.8)
RACE/ETHNICITY							
WHITE	76.3(1.0)	76.8(1.2)	79.6(1.3)	86.9(0.9)	10.6(1.3)	10.0(1.5)	7.3(1.6)
BLACK	42.0(1.4)	46.1(2.4)	53.4(2.5)	60.0(2.8)	17.9(3.1)	13.9(3.6)	6.6(3.7)
HISPANIC	54.2(2.8)	55.7(2.3)	57.6(2.9)	68.4(3.0)	14.2(4.1)	12.7(3.8)	10.9(4.2)
OTHER	80.3(3.6)	85.2(3.4)	70.4(8.0)	87.0(5.4)	6.6(6.5)	1.8(6.4)	16.5(9.7)
REGION							
NORTHEAST	78.7(2.3)	78.0(2.1)	77.9(3.2)	85.9(2.2)	7.2(3.2)	7.9(3.1)	8.0(3.9)
SOUTHEAST	60.3(1.8)	62.5(2.3)	70.6(2.7)	75.1(2.8)	14.8(3.3)	12.5(3.7)	4.5(3.9)
CENTRAL	75.9(1.7)	73.8(2.7)	77.6(2.5)	83.7(1.3)	7.8(2.1)	9.9(3.0)	6.1(2.8)
WEST	65.6(1.7)	71.9(2.2)	70.5(2.9)	81.4(1.8)	15.8(2.5)	9.5(2.9)	10.9(3.4)
TYPE OF COMMUNITY							
EXTREME RURAL	63.4(3.7)	63.7(3.0)	73.3(7.4)	82.5(3.4)	19.1(5.0)	18.8(4.5)	9.2(8.1)
DISADVANTAGED URBAN	49.0(3.4)	49.7(2.5)	55.6(2.9)	67.4(6.3)	18.4(7.1)	17.6(6.8)	11.8(6.9)
ADVANTAGED URBAN	87.7(1.6)	89.1(2.0)	89.2(2.0)	92.6(1.0)	5.0(1.9)	3.5(2.2)	3.4(2.2)
OTHER	70.6(0.9)	72.2(1.1)	72.2(1.6)	81.2(1.1)	10.6(1.4)	9.1(1.5)	9.0(2.0)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	51.8(2.7)	51.0(2.6)	50.1(3.9)	63.4(4.7)	11.5(5.4)	12.4(5.3)	13.3(6.1)
GRADUATED H.S.	71.7(1.4)	72.1(1.4)	72.2(2.1)	79.3(1.6)	7.6(2.1)	7.3(2.1)	7.1(2.7)
SOME EDUC AFTER H.S.	80.7(2.0)	77.9(2.5)	80.7(2.7)	85.7(2.3)	4.9(3.0)	7.7(3.4)	4.9(3.5)
GRADUATED COLLEGE	82.1(1.3)	80.3(1.5)	82.6(1.2)	87.2(1.3)	5.1(1.8)	6.9(2.0)	4.6(1.8)
UNKNOWN	63.6(1.3)	64.9(2.2)	67.7(1.6)	77.1(1.4)	13.5(1.9)	12.2(2.6)	9.5(2.2)
TYPE OF SCHOOL							
PUBLIC	68.8(0.9)	69.4(1.2)	72.7(1.4)	80.5(1.1)	11.7(1.4)	11.1(1.6)	7.8(1.8)
PRIVATE	83.3(1.9)	84.3(2.1)	81.8(2.3)	89.3(1.8)	6.0(2.6)	5.0(2.8)	7.5(2.9)
QUARTILES							
UPPER	99.6(0.1)	99.7(0.2)	99.9(0.2)	100.0(0.2)	0.4(0.2)	0.3(0.3)	0.1(0.3)
MIDDLE TWO	82.2(0.6)	84.3(0.7)	89.5(0.9)	95.8(0.5)	13.6(0.7)	11.5(0.9)	6.3(1.0)
LOWER	17.7(0.9)	17.5(1.6)	17.6(1.5)	34.3(2.2)	16.6(2.4)	16.7(2.7)	16.7(2.6)

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Percentage of Students with Mathematics Proficiency At or Above Anchor Level 250

	1977-78	1981-82	1985-86	1989-90	DIFFERENCE 1978-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	19.6(0.7)	18.8(1.0)	20.7(0.9)	27.7(0.9)	8.1(1.1)	8.9(1.3)	7.0(1.2)
SEX							
MALE	19.2(0.6)	18.1(1.1)	20.9(1.1)	27.5(1.0)	8.3(1.2)	9.4(1.4)	6.7(1.5)
FEMALE	19.9(1.0)	19.6(1.1)	20.6(1.3)	27.9(1.3)	8.0(1.7)	8.4(1.7)	7.4(1.8)
RACE/ETHNICITY							
WHITE	22.9(0.9)	21.8(1.1)	24.6(1.0)	32.7(1.0)	9.9(1.4)	10.9(1.5)	8.1(1.5)
BLACK	4.1(0.6)	4.4(0.8)	5.6(0.9)	9.4(1.7)	5.3(1.8)	5.1(1.9)	3.8(1.9)
HISPANIC	9.2(2.5)	7.8(1.7)	7.3(2.8)	11.3(3.5)	2.0(4.3)	3.5(3.9)	4.0(4.5)
OTHER	25.1(3.6)	38.3(4.7)	25.1(6.4)	31.7(3.6)	6.6(5.1)	-6.6(5.9)	6.6(7.3)
REGION							
NORTHEAST	25.9(1.6)	23.8(1.4)	24.8(2.7)	34.4(2.1)	8.5(2.6)	10.6(2.5)	9.6(3.4)
SOUTHEAST	13.4(0.8)	13.6(1.7)	17.2(2.4)	24.0(2.0)	10.6(2.1)	10.4(2.6)	6.7(3.2)
CENTRAL	23.2(1.4)	19.9(2.5)	24.7(1.8)	27.5(1.8)	4.3(2.2)	7.6(3.1)	2.9(2.5)
WEST	14.9(1.1)	18.6(1.4)	16.3(2.2)	25.6(1.6)	10.7(1.9)	7.0(2.1)	9.3(2.7)
TYPE OF COMMUNITY							
EXTREME RURAL	16.3(1.6)	13.0(3.3)	18.4(6.2)	28.6(3.5)	12.2(3.9)	15.6(4.8)	10.1(7.1)
DISADVANTAGED URBAN	7.2(1.6)	6.0(1.4)	8.3(2.5)	14.2(3.6)	7.0(3.9)	8.2(3.8)	5.9(4.4)
ADVANTAGED URBAN	35.6(2.5)	36.6(2.7)	36.8(3.2)	42.4(3.0)	6.9(3.9)	5.8(4.1)	5.6(4.4)
OTHER	18.7(0.7)	18.4(0.8)	18.2(1.3)	26.9(1.0)	8.2(1.2)	8.4(1.3)	8.7(1.6)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	7.5(1.2)	7.1(1.5)	6.4(2.3)	9.9(2.6)	2.4(2.9)	2.8(3.0)	3.5(3.5)
GRADUATED H.S.	18.8(1.1)	16.4(1.3)	17.4(2.1)	23.6(1.6)	4.8(2.0)	7.1(2.1)	6.2(2.7)
SOME EDUC AFTER H.S.	29.2(1.9)	23.7(2.9)	26.6(2.6)	35.0(4.2)	5.8(4.6)	11.4(5.1)	8.5(4.9)
GRADUATED COLLEGE	30.4(1.3)	27.2(1.3)	29.6(1.4)	36.6(1.7)	6.2(2.2)	9.4(2.1)	7.0(2.2)
UNKNOWN	13.4(1.1)	13.6(1.3)	13.3(1.1)	19.7(1.1)	6.3(1.6)	6.1(1.7)	6.3(1.6)
TYPE OF SCHOOL							
PUBLIC	18.5(0.7)	17.3(0.9)	19.1(1.1)	26.8(1.0)	8.3(1.2)	9.5(1.3)	7.7(1.5)
PRIVATE	28.4(2.0)	28.6(2.6)	28.9(2.7)	35.2(3.3)	6.8(3.8)	6.6(4.2)	6.3(4.3)
QUARTILES							
UPPER	59.7(1.4)	60.0(1.6)	67.9(1.4)	79.8(1.3)	20.1(1.9)	19.8(2.1)	11.9(1.9)
MIDDLE TWO	9.3(0.6)	7.7(0.7)	7.5(0.7)	15.5(0.8)	6.2(1.0)	7.8(1.0)	8.1(1.0)
LOWER	0.1(0.1)	0.0(0.1)	0.0(0.1)	0.1(0.2)	0.0(0.2)	0.0(0.2)	0.0(0.2)

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Percentage of Students with Mathematics Proficiency At or Above Anchor Level 300

	1977-78	1981-82	1985-86	1989-90	DIFFERENCE 1978-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	0.8(0.1)	0.6(0.1)	0.6(0.2)	1.2(0.3)	0.4(0.3)	0.6(0.3)	0.5(0.4)
SEX							
MALE	0.7(0.2)	0.6(0.1)	0.7(0.3)	1.3(0.4)	0.6(0.5)	0.7(0.5)	0.6(0.5)
FEMALE	0.8(0.2)	0.5(0.1)	0.6(0.3)	1.0(0.3)	0.2(0.4)	0.5(0.3)	0.5(0.4)
RACE/ETHNICITY							
WHITE	0.9(0.2)	0.6(0.1)	0.8(0.3)	1.5(0.4)	0.5(0.4)	0.8(0.4)	0.7(0.5)
BLACK	0.0(0.0)	0.0(0.0)	0.1(0.0)	0.1(0.1)	0.0(0.1)	0.0(0.1)	0.0(0.1)
HISPANIC	0.2(0.5)	0.0(0.5)	0.1(0.5)	0.2(0.5)	0.0(0.6)	0.2(0.6)	0.1(0.6)
OTHER	1.9(0.9)	3.7(2.1)	0.8(0.8)	2.0(1.0)	0.1(1.3)	-1.7(2.3)	1.2(1.3)
REGION							
NORTHEAST	1.3(0.5)	0.9(0.3)	1.0(0.4)	2.1(0.7)	0.8(0.9)	1.2(0.8)	1.1(0.9)
SOUTHEAST	0.3(0.2)	0.3(0.1)	0.3(0.2)	1.2(0.6)	0.8(0.6)	0.9(0.6)	0.8(0.6)
CENTRAL	1.1(0.3)	0.6(0.3)	1.0(0.7)	0.6(0.2)	-0.5(0.4)	0.1(0.3)	-0.4(0.7)
WEST	0.4(0.2)	0.6(0.1)	0.2(0.2)	0.9(0.4)	0.6(0.4)	0.3(0.4)	0.7(0.4)
TYPE OF COMMUNITY							
EXTREME RURAL	0.6(0.6)	0.3(0.2)	0.3(0.6)	0.9(0.6)	0.3(0.8)	0.6(0.6)	0.6(0.8)
DISADVANTAGED URBAN	0.1(0.2)	0.1(0.1)	0.0(0.1)	0.1(0.1)	0.0(0.2)	0.1(0.2)	0.1(0.2)
ADVANTAGED URBAN	2.1(0.7)	2.0(0.4)	1.9(1.2)	3.0(1.2)	0.9(1.4)	0.9(1.3)	1.1(1.7)
OTHER	0.7(0.1)	0.5(0.1)	0.4(0.1)	1.0(0.3)	0.4(0.3)	0.6(0.3)	0.6(0.3)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	0.1(0.2)	0.0(0.2)	0.0(0.2)	0.0(0.2)	-0.1(0.3)	0.0(0.3)	0.0(0.3)
GRADUATED H.S.	0.6(0.2)	0.4(0.2)	0.4(0.4)	0.4(0.4)	-0.2(0.5)	0.0(0.4)	0.0(0.6)
SOME EDUC AFTER H.S.	1.6(0.6)	0.5(0.5)	1.2(0.9)	1.4(0.8)	-0.1(1.0)	0.9(1.0)	0.3(1.2)
GRADUATED COLLEGE	1.6(0.5)	1.0(0.3)	1.2(0.5)	2.1(0.5)	0.6(0.7)	1.1(0.6)	1.0(0.7)
UNKNOWN	0.3(0.1)	0.4(0.2)	0.2(0.1)	0.5(0.3)	0.2(0.3)	0.1(0.4)	0.3(0.3)
TYPE OF SCHOOL							
PUBLIC	0.7(0.2)	0.5(0.1)	0.6(0.2)	1.1(0.3)	0.4(0.3)	0.6(0.3)	0.5(0.4)
PRIVATE	1.2(0.4)	1.0(0.6)	1.1(0.6)	1.8(1.2)	0.6(1.2)	0.8(1.3)	0.7(1.3)
QUARTILES							
UPPER	3.0(0.5)	2.2(0.3)	2.6(0.8)	4.6(1.1)	1.6(1.3)	2.3(1.2)	2.0(1.4)
MIDDLE TWO	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.1(0.1)	0.0(0.1)	0.0(0.1)	0.0(0.1)
LOWER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)

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Percentage of Students with Mathematics Proficiency At or Above Anchor Level 350

	1977-78	1981-82	1985-86	1989-90	DIFFERENCE 1978-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
SEX							
MALE	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
FEMALE	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
RACE/ETHNICITY							
WHITE	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
BLACK	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
HISPANIC	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
OTHER	0.0(0.0)	0.1(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	-0.1(0.0)	0.0(0.0)
REGION							
NORTHEAST	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
SOUTHEAST	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
CENTRAL	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
WEST	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
TYPE OF COMMUNITY							
EXTREME RURAL	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
DISADVANTAGED URBAN	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
ADVANTAGED URBAN	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
OTHER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
GRADUATED H.S.	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
SOME EDUC AFTER H.S.	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
GRADUATED COLLEGE	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
UNKNOWN	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
TYPE OF SCHOOL							
PUBLIC	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
PRIVATE	0.0(0.0)	0.0([illegible].0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
QUARTILES							
UPPER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
MIDDLE TWO	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
LOWER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)

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Percentage of Students with Mathematics Proficiency At or Above Anchor Level 150

	1977-78	1981-82	1985-86	1989-90	DIFFERENCE 1978-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	99.8(0.1)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.2(0.1)	0.0(0.0)	0.0(0.0)
SEX							
MALE	99.7(0.1)	100.0(0.1)	100.0(0.0)	100.0(0.0)	0.3(0.1)	0.0(0.1)	0.0(0.0)
FEMALE	99.8(0.1)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.2(0.1)	0.0(0.1)	0.0(0.1)
RACE/ETHNICITY							
WHITE	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
BLACK	98.6(0.4)	99.8(0.2)	100.0(0.2)	100.0(0.2)	1.4(0.5)	0.2(0.3)	0.0(0.3)
HISPANIC	99.6(0.3)	99.9(0.1)	100.0(0.3)	99.9(0.3)	0.4(0.4)	0.0(0.3)	0.0(0.4)
OTHER	99.8(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.2(0.0)	0.0(0.0)	0.0(0.0)
REGION							
NORTHEAST	99.9(0.1)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.1(0.1)	0.0(0.1)	0.0(0.1)
SOUTHEAST	99.4(0.2)	99.9(0.1)	100.0(0.1)	100.0(0.1)	0.6(0.3)	0.1(0.2)	0.0(0.2)
CENTRAL	99.9(0.1)	100.0(0.1)	100.0(0.1)	100.0(0.1)	0.1(0.1)	0.0(0.1)	0.0(0.1)
WEST	99.8(0.1)	100.0(0.0)	100.0(0.1)	100.0(0.1)	0.2(0.2)	0.0(0.1)	0.0(0.1)
TYPE OF COMMUNITY							
EXTREME RURAL	99.6(0.2)	100.0(0.2)	100.0(0.2)	100.0(0.2)	0.4(0.3)	0.0(0.3)	0.0(0.3)
DISADVANTAGED URBAN	98.6(0.5)	99.9(0.2)	99.9(0.2)	99.9(0.2)	1.4(0.6)	0.1(0.3)	0.0(0.3)
ADVANTAGED URBAN	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
OTHER	99.9(0.1)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.1(0.1)	0.0(0.1)	0.0(0.1)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	99.5(0.2)	99.9(0.2)	100.0(0.2)	100.0(0.2)	0.5(0.3)	0.1(0.3)	0.0(0.3)
GRADUATED H.S.	99.9(0.1)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.1(0.1)	0.0(0.0)	0.0(0.0)
SOME EDUC AFTER H.S.	99.9(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.1(0.1)	0.0(0.1)	0.0(0.1)
GRADUATED COLLEGE	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
UNKNOWN	99.1(0.3)	99.9(0.1)	100.0(0.2)	100.0(0.2)	0.8(0.3)	0.1(0.2)	0.0(0.3)
TYPE OF SCHOOL							
PUBLIC	99.7(0.1)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.3(0.1)	0.0(0.0)	0.0(0.0)
PRIVATE	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
QUARTILES							
UPPER	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
MIDDLE TWO	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
LOWER	99.0(0.3)	99.9(0.1)	100.0(0.1)	100.0(0.1)	0.9(0.3)	0.1(0.1)	0.0(0.1)

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Percentage of Students with Mathematics Proficiency At or Above Anchor Level 200

	1977-78	1981-82	1985-86	1989-90	DIFFERENCE 1978-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	94.6(0.5)	97.7(0.4)	98.6(0.2)	98.5(0.2)	4.0(0.5)	0.8(0.4)	0.0(0.3)
SEX							
MALE	93.9(0.5)	97.5(0.6)	98.5(0.3)	98.2(0.3)	4.3(0.6)	0.6(0.6)	-0.3(0.5)
FEMALE	95.2(0.5)	98.0(0.3)	98.6(0.3)	98.9(0.2)	3.7(0.5)	0.9(0.3)	0.3(0.4)
RACE/ETHNICITY							
WHITE	97.6(0.3)	99.1(0.1)	99.3(0.3)	99.4(0.1)	1.8(0.3)	0.2(0.2)	0.1(0.3)
BLACK	79.7(1.5)	90.2(1.6)	95.4(0.9)	95.4(1.1)	15.7(1.8)	5.2(1.9)	0.1(1.5)
HISPANIC	86.4(0.9)	95.9(0.9)	96.9(1.4)	96.8(1.1)	10.4(1.4)	0.8(1.4)	-0.1(1.8)
OTHER	97.3(1.5)	99.1(0.6)	99.6(0.4)	98.3(1.0)	1.1(1.8)	-0.7(1.2)	-1.3(1.1)
REGION							
NORTHEAST	96.5(0.9)	99.0(0.3)	99.2(0.2)	99.1(0.6)	2.6(1.1)	0.1(0.6)	-0.1(0.6)
SOUTHEAST	90.1(1.6)	95.6(1.0)	98.3(0.6)	97.8(0.6)	7.7(1.7)	2.2(1.2)	-0.5(0.8)
CENTRAL	96.8(0.4)	98.6(0.5)	98.4(1.0)	99.0(0.3)	2.2(0.5)	0.4(0.6)	0.6(1.1)
WEST	94.0(0.9)	97.6(0.9)	98.3(0.5)	98.3(0.5)	4.3(1.0)	0.7(1.0)	-0.1(0.7)
TYPE OF COMMUNITY							
EXTREME RURAL	92.0(1.4)	96.8(0.9)	99.4(0.9)	97.8(1.2)	5.7(1.8)	0.9(1.5)	-1.6(1.5)
DISADVANTAGED URBAN	80.0(2.7)	91.0(2.9)	94.6(1.3)	95.7(1.3)	15.7(3.0)	4.7(3.2)	1.1(1.9)
ADVANTAGED URBAN	98.6(0.4)	99.8(0.1)	99.2(0.5)	99.4(0.6)	0.8(0.7)	-0.5(0.6)	0.1(0.7)
OTHER	95.7(0.4)	98.2(0.3)	98.9(0.2)	99.0(0.2)	3.2(0.5)	0.7(0.4)	0.1(0.3)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	89.2(1.1)	95.3(1.2)	96.5(1.6)	96.4(1.3)	7.2(1.7)	1.1(1.8)	-0.1(2.1)
GRADUATED H.S.	96.0(0.4)	98.0(0.4)	98.8(0.5)	98.5(0.5)	2.5(0.7)	0.4(0.6)	-0.3(0.7)
SOME EDUC AFTER H.S.	97.6(0.6)	98.6(0.3)	99.3(0.4)	99.7(0.3)	2.1(0.6)	1.1(0.4)	0.4(0.4)
GRADUATED COLLEGE	98.8(0.2)	98.9(0.4)	99.2(0.3)	99.3(0.2)	0.6(0.3)	0.5(0.5)	0.2(0.4)
UNKNOWN	85.5(1.3)	94.1(1.6)	95.2(1.7)	94.2(1.6)	8.7(2.0)	0.2(2.2)	-1.0(2.3)
TYPE OF SCHOOL							
PUBLIC	94.1(0.5)	97.5(0.4)	98.5(0.3)	98.4(0.2)	4.3(0.5)	0.9(0.5)	-0.1(0.4)
PRIVATE	99.0(0.4)	99.5(0.3)	98.9(0.6)	99.7(0.3)	0.7(0.6)	0.2(0.4)	0.7(0.7)
QUARTILES							
UPPER	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
MIDDLE TWO	99.6(0.1)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.4(0.1)	0.0(0.0)	0.0(0.0)
LOWER	79.0(1.2)	91.0(1.2)	94.2(0.8)	94.1(0.8)	15.1(1.4)	3.1(1.4)	-0.1(1.1)

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Percentage of Students with Mathematics Proficiency At or Above Anchor Level 250

	1977-78	1981-82	1985-86	1989-90	DIFFERENCE 1978-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	64.9(1.2)	71.4(1.2)	73.3(1.6)	74.7(1.0)	9.8(1.6)	3.4(1.6)	1.5(1.9)
SEX							
MALE	63.9(1.3)	71.3(1.4)	73.8(1.8)	75.1(1.8)	11.1(2.2)	3.8(2.3)	1.2(2.5)
FEMALE	65.9(1.2)	71.4(1.3)	72.7(1.9)	74.4(1.3)	8.5(1.8)	3.0(1.8)	1.7(2.4)
RACE/ETHNICITY							
WHITE	72.9(0.9)	78.3(0.9)	78.9(1.7)	82.0(1.0)	9.1(1.3)	3.7(1.4)	3.1(2.0)
BLACK	28.7(2.1)	37.9(2.5)	49.0(3.7)	48.7(3.6)	20.0(4.1)	10.7(4.4)	-0.3(5.1)
HISPANIC	36.0(2.9)	52.2(2.5)	56.0(5.0)	56.7(3.3)	20.7(4.4)	4.5(4.1)	0.7(6.0)
OTHER	68.6(4.3)	75.3(5.9)	85.7(4.7)	76.5(5.0)	7.9(6.5)	1.1(7.7)	-9.2(6.8)
REGION							
NORTHEAST	73.4(2.4)	79.4(1.5)	80.5(2.2)	78.2(2.3)	4.9(3.3)	-1.1(2.7)	-2.3(3.2)
SOUTHEAST	53.5(3.6)	60.3(2.0)	68.6(2.3)	70.1(2.4)	16.6(4.3)	9.8(3.1)	1.5(3.3)
CENTRAL	70.4(1.9)	75.9(2.4)	70.7(6.3)	77.9(2.8)	7.5(3.4)	2.0(3.6)	7.2(6.9)
WEST	60.5(2.4)	69.0(3.0)	73.9(2.2)	72.9(1.8)	12.4(2.9)	3.9(3.5)	-0.9(2.8)
TYPE OF COMMUNITY							
EXTREME RURAL	55.9(3.7)	60.5(2.6)	74.8(11.3)	69.1(5.3)	13.2(6.4)	8.6(5.9)	-5.8(12.5)
DISADVANTAGED URBAN	32.1(4.3)	43.7(5.4)	47.0(5.1)	53.9(3.7)	21.8(5.7)	10.2(6.6)	6.9(6.3)
ADVANTAGED URBAN	83.6(1.6)	91.8(0.9)	89.5(1.6)	87.4(2.3)	3.9(2.8)	-4.4(2.5)	-2.1(2.8)
OTHER	66.9(1.2)	72.9(1.1)	73.8(1.6)	77.1(1.3)	10.2(1.7)	4.2(1.7)	3.3(2.0)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	44.6(1.7)	51.2(2.3)	54.7(3.9)	55.8(2.6)	11.2(3.1)	4.6(3.5)	1.1(4.7)
GRADUATED H.S.	64.9(1.2)	66.7(1.0)	68.7(1.5)	68.2(1.9)	3.3(2.2)	1.6(2.1)	-0.5(2.4)
SOME EDUC AFTER H.S.	75.5(1.5)	80.5(1.3)	80.7(1.9)	84.6(1.5)	9.0(2.1)	4.1(2.0)	3.9(2.4)
GRADUATED COLLEGE	83.4(1.1)	84.2(1.5)	83.5(1.6)	84.1(1.1)	0.8(1.6)	-0.1(1.8)	0.6(1.9)
UNKNOWN	39.3(1.5)	52.7(3.9)	45.2(4.4)	46.3(3.6)	7.0(3.9)	-6.4(5.4)	1.1(5.7)
TYPE OF SCHOOL							
PUBLIC	63.3(1.2)	69.7(1.3)	72.9(1.7)	73.3(1.2)	10.0(1.7)	3.6(1.8)	0.4(2.0)
PRIVATE	80.8(1.7)	85.1(1.6)	81.9(3.3)	87.0(2.0)	6.2(2.6)	1.9(2.5)	5.0(3.9)
QUARTILES							
UPPER	98.8(0.3)	99.8(0.1)	100.0(0.1)	99.9(0.1)	1.1(0.3)	0.1(0.2)	-0.1(0.2)
MIDDLE TWO	74.0(0.6)	83.9(0.8)	88.2(1.1)	89.6(0.8)	15.6(1.0)	5.6(1.1)	1.4(1.4)
LOWER	12.9(0.6)	17.8(0.9)	16.7(1.5)	19.7(1.7)	6.8(1.8)	2.0(1.9)	3.1(2.3)

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Percentage of Students with Mathematics Proficiency At or Above Anchor Level 300

	1977-78	1981-82	1985-86	1989-90	DIFFERENCE 1978-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	18.0(0.7)	17.4(0.9)	15.8(1.0)	17.3(1.0)	-0.6(1.2)	-0.1(1.4)	1.5(1.4)
SEX							
MALE	18.4(0.9)	18.9(1.2)	17.6(1.1)	19.0(1.2)	0.5(1.5)	0.0(1.7)	1.3(1.7)
FEMALE	17.5(0.7)	15.9(1.0)	14.1(1.3)	15.7(1.0)	-1.7(1.2)	-0.2(1.4)	1.7(1.7)
RACE/ETHNICITY							
WHITE	21.4(0.7)	20.5(1.0)	18.6(1.2)	21.0(1.2)	-0.4(1.4)	0.5(1.6)	2.5(1.7)
BLACK	2.3(0.5)	2.9(1.0)	4.0(1.4)	3.9(1.6)	1.7(1.7)	1.1(1.9)	-0.1(2.1)
HISPANIC	4.0(1.0)	6.3(1.0)	5.5(1.1)	6.4(1.7)	2.4(1.9)	0.1(2.0)	0.9(2.0)
OTHER	27.4(4.8)	24.2(3.9)	28.1(6.2)	22.2(8.3)	-5.2(9.6)	-1.9(9.2)	-5.9(10.3)
REGION							
NORTHEAST	24.2(1.9)	23.9(2.1)	22.5(2.4)	21.3(2.4)	-2.9(3.1)	-2.6(3.2)	-1.2(3.4)
SOUTHEAST	11.6(1.5)	10.2(1.3)	10.0(1.3)	13.7(1.4)	2.1(2.1)	3.5(2.0)	3.7(2.0)
CENTRAL	20.4(1.3)	20.1(1.8)	12.8(2.6)	17.4(2.4)	-3.1(2.7)	-2.8(3.0)	4.5(3.5)
WEST	14.8(1.2)	15.1(1.8)	18.3(2.3)	16.9(1.8)	2.1(2.2)	1.8(2.5)	-1.4(2.9)
TYPE OF COMMUNITY							
EXTREME RURAL	11.3(1.8)	8.8(0.8)	16.8(4.4)	12.5(2.3)	1.1(2.9)	3.6(2.5)	-4.3(5.0)
DISADVANTAGED URBAN	5.2(1.8)	7.3(3.1)	4.3(1.4)	7.9(2.1)	2.7(2.8)	0.5(3.7)	3.6(2.5)
ADVANTAGED URBAN	34.2(1.7)	38.3(1.9)	31.7(2.6)	28.2(3.5)	-6.0(3.9)	-10.1(4.0)	-3.5(4.4)
OTHER	18.0(0.9)	17.0(0.9)	14.7(1.0)	18.0(1.3)	0.0(1.6)	1.0(1.6)	3.3(1.6)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	5.8(0.6)	5.6(0.7)	4.5(1.3)	4.7(1.4)	-1.1(1.5)	-0.9(1.5)	0.1(1.9)
GRADUATED H.S.	14.8(0.7)	10.8(0.7)	8.0(0.9)	8.7(0.9)	-6.1(1.1)	-2.0(1.1)	0.7(1.3)
SOME EDUC AFTER H.S.	22.2(1.3)	20.4(1.2)	16.9(2.2)	19.8(1.8)	-2.3(2.2)	-0.6(2.2)	2.9(2.9)
GRADUATED COLLEGE	32.6(1.5)	30.0(1.6)	26.0(1.4)	26.9(1.5)	-5.7(2.1)	-3.1(2.3)	0.9(2.0)
UNKNOWN	5.4(0.9)	7.2(1.9)	4.3(1.9)	4.2(1.3)	-1.2(1.6)	-2.9(2.3)	-0.1(2.3)
TYPE OF SCHOOL							
PUBLIC	17.0(0.8)	16.4(1.0)	15.6(1.0)	16.7(1.1)	-0.4(1.3)	0.3(1.5)	1.1(1.5)
PRIVATE	26.9(1.8)	26.3(3.1)	22.0(6.8)	23.2(2.5)	-3.7(3.0)	-3.0(3.9)	1.2(7.2)
QUARTILES							
UPPER	56.9(0.9)	59.1(1.5)	59.6(1.9)	63.2(1.6)	6.4(1.8)	4.1(2.2)	3.6(2.4)
MIDDLE TWO	7.4(0.4)	5.3(0.4)	1.9(0.6)	3.1(0.5)	-4.4(0.6)	-2.3(0.6)	1.2(0.7)
LOWER	0.1(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	-0.1(0.1)	0.0(0.0)	0.0(0.0)

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Percentage of Students with Mathematics Proficiency At or Above Anchor Level 350

	1977-78	1981-82	1985-86	1989-90	DIFFERENCE 1978-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	1.0(0.2)	0.5(0.1)	0.4(0.1)	0.4(0.1)	-0.6(0.2)	-0.2(0.2)	0.0(0.2)
SEX							
MALE	1.1(0.2)	0.7(0.2)	0.5(0.2)	0.5(0.2)	-0.6(0.3)	-0.2(0.2)	0.0(0.2)
FEMALE	0.9(0.2)	0.4(0.2)	0.3(0.1)	0.2(0.1)	-0.7(0.2)	-0.1(0.2)	-0.1(0.2)
RACE/ETHNICITY							
WHITE	1.2(0.2)	0.6(0.1)	0.4(0.1)	0.4(0.2)	-0.8(0.3)	-0.2(0.2)	0.0(0.2)
BLACK	0.0(0.1)	0.0(0.0)	0.1(0.1)	0.1(0.3)	0.1(0.3)	0.1(0.3)	0.1(0.3)
HISPANIC	0.1(0.1)	0.0(0.1)	0.2(0.4)	0.1(0.1)	0.0(0.2)	0.1(0.2)	-0.1(0.4)
OTHER	3.7(2.1)	1.0(0.5)	1.4(1.1)	0.5(0.7)	-3.2(2.2)	-0.5(0.8)	-0.8(1.3)
REGION							
NORTHEAST	1.3(0.5)	1.0(0.4)	0.7(0.3)	0.7(0.4)	-0.7(0.6)	-0.4(0.6)	0.0(0.5)
SOUTHEAST	0.5(0.2)	0.1(0.1)	0.2(0.2)	0.1(0.1)	-0.4(0.2)	0.0(0.2)	0.0(0.2)
CENTRAL	1.2(0.3)	0.6(0.2)	0.3(0.3)	0.3(0.2)	-0.9(0.3)	-0.3(0.3)	0.0(0.4)
WEST	0.8(0.3)	0.3(0.1)	0.4(0.3)	0.3(0.2)	-0.5(0.3)	0.0(0.2)	-0.1(0.4)
TYPE OF COMMUNITY							
EXTREME RURAL	0.4(0.2)	0.1(0.2)	0.0(0.2)	0.1(0.2)	-0.3(0.3)	0.0(0.3)	0.1(0.3)
DISADVANTAGED URBAN	0.2(0.1)	0.3(0.5)	0.2(0.4)	0.1(0.4)	-0.1(0.5)	-0.3(0.7)	-0.1(0.6)
ADVANTAGED URBAN	2.9(0.8)	1.9(0.8)	1.0(0.5)	0.6(0.4)	-2.4(0.9)	-1.4(0.9)	-0.4(0.6)
OTHER	0.9(0.2)	0.4(0.1)	0.3(0.1)	0.4(0.1)	-0.5(0.3)	0.0(0.2)	0.1(0.2)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	0.1(0.1)	0.0(0.1)	0.0(0.1)	0.0(0.1)	-0.1(0.1)	0.0(0.1)	0.0(0.1)
GRADUATED H.S.	0.5(0.1)	0.1(0.1)	0.1(0.1)	0.0(0.1)	-0.4(0.2)	-0.1(0.1)	0.0(0.2)
SOME EDUC AFTER H.S.	1.1(0.2)	0.5(0.2)	0.5(0.4)	0.4(0.3)	-0.6(0.4)	-0.1(0.4)	0.0(0.5)
GRADUATED COLLEGE	2.6(0.6)	1.2(0.4)	0.7(0.3)	0.7(0.3)	-1.9(0.7)	-0.6(0.5)	0.0(0.4)
UNKNOWN	0.1(0.1)	0.0(0.1)	0.0(0.1)	0.1(0.1)	0.0(0.1)	0.0(0.1)	0.1(0.1)
TYPE OF SCHOOL							
PUBLIC	0.9(0.2)	0.5(0.1)	0.4(0.1)	0.3(0.1)	-0.6(0.2)	-0.2(0.2)	-0.1(0.2)
PRIVATE	1.4(0.4)	1.0(0.3)	0.1(0.2)	0.7(0.4)	-0.8(0.6)	-0.3(0.5)	0.6(0.5)
QUARTILES							
UPPER	3.9(0.6)	2.1(0.4)	1.5(0.5)	1.4(0.5)	-2.5(0.8)	-0.7(0.6)	-0.1(0.7)
MIDDLE TWO	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
LOWER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)

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Percentage of Students with Mathematics Proficiency At or Above Anchor Level 150

	1977-78	1981-82	1985-86	1989-90	DIFFERENCE 1978-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
SEX							
MALE	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
FEMALE	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
RACE/ETHNICITY							
WHITE	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
BLACK	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
HISPANIC	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
OTHER	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
REGION							
NORTHEAST	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
SOUTHEAST	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
CENTRAL	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
WEST	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
TYPE OF COMMUNITY							
EXTREME RURAL	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
DISADVANTAGED URBAN	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
ADVANTAGED URBAN	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
OTHER	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
GRADUATED H.S.	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
SOME EDUC AFTER H.S.	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
GRADUATED COLLEGE	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
UNKNOWN	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
TYPE OF SCHOOL							
PUBLIC	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
PRIVATE	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
QUARTILES							
UPPER	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
MIDDLE TWO	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
LOWER	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)

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Percentage of Students with Mathematics Proficiency At or Above Anchor Level 200

	1977-78	1981-82	1985-86	1989-90	DIFFERENCE 1978-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	99.8(0.1)	99.9(0.0)	99.9(0.1)	100.0(0.1)	0.1(0.1)	0.0(0.1)	0.0(0.1)
SEX							
MALE	99.9(0.1)	100.0(0.1)	99.9(0.1)	99.9(0.1)	0.0(0.1)	0.0(0.1)	0.0(0.1)
FEMALE	99.7(0.1)	99.9(0.0)	100.0(0.1)	100.0(0.1)	0.2(0.1)	0.1(0.1)	0.0(0.1)
RACE/ETHNICITY							
WHITE	100.0(0.0)	100.0(0.0)	100.0(0.1)	100.0(0.1)	0.0(0.1)	0.0(0.1)	0.0(0.1)
BLACK	98.8(0.3)	99.7(0.2)	100.0(0.2)	99.9(0.2)	1.1(0.4)	0.3(0.3)	0.0(0.3)
HISPANIC	99.3(0.4)	99.8(0.3)	99.4(1.2)	99.6(0.7)	0.3(0.8)	-0.2(0.7)	0.2(1.4)
OTHER	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
REGION							
NORTHEAST	99.9(0.1)	99.9(0.0)	100.0(0.0)	100.0(0.0)	0.1(0.1)	0.1(0.0)	0.0(0.0)
SOUTHEAST	99.6(0.2)	99.9(0.1)	100.0(0.1)	100.0(0.1)	0.3(0.2)	0.1(0.2)	0.0(0.2)
CENTRAL	99.9(0.1)	100.0(0.0)	100.0(0.1)	100.0(0.1)	0.1(0.2)	0.0(0.1)	0.0(0.2)
WEST	99.8(0.1)	99.9(0.1)	99.8(0.3)	99.9(0.3)	0.1(0.3)	0.0(0.3)	0.1(0.4)
TYPE OF COMMUNITY							
EXTREME RURAL	99.8(0.2)	99.9(0.2)	100.0(0.2)	99.9(0.2)	0.1(0.2)	0.0(0.2)	-0.1(0.2)
DISADVANTAGED URBAN	98.8(0.5)	99.7(0.2)	99.9(0.2)	99.9(0.3)	1.1(0.6)	0.2(0.3)	-0.1(0.3)
ADVANTAGED URBAN	100.0(0.1)	100.0(0.1)	100.0(0.1)	100.0(0.1)	0.0(0.1)	0.0(0.1)	0.0(0.1)
OTHER	99.9(0.0)	100.0(0.0)	99.9(0.1)	100.0(0.1)	0.1(0.1)	0.0(0.1)	0.0(0.2)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	99.5(0.3)	99.8(0.1)	100.0(0.1)	99.9(0.1)	0.4(0.3)	0.0(0.1)	-0.1(0.1)
GRADUATED H.S.	99.8(0.1)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.2(0.1)	0.0(0.1)	0.0(0.1)
SOME EDUC AFTER H.S.	99.9(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.1(0.1)	0.0(0.1)	0.0(0.1)
GRADUATED COLLEGE	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
UNKNOWN	99.1(0.4)	99.5(0.5)	100.0(0.5)	99.3(1.1)	0.1(1.1)	-0.3(1.2)	-0.7(1.2)
TYPE OF SCHOOL							
PUBLIC	99.8(0.1)	99.9(0.0)	99.9(0.1)	100.0(0.1)	0.2(0.1)	0.0(0.1)	0.0(0.1)
PRIVATE	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
QUARTILES							
UPPER	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
MIDDLE TWO	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
LOWER	99.3(0.2)	99.7(0.1)	99.8(0.3)	99.8(0.2)	0.6(0.3)	0.1(0.2)	0.1(0.4)

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Percentage of Students with Mathematics Proficiency At or Above Anchor Level 250

	1977-78	1981-82	1985-86	1989-90	DIFFERENCE 1978-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	92.0(0.5)	93.0(0.5)	95.6(0.5)	96.0(0.5)	4.0(0.7)	3.0(0.7)	0.4(0.7)
SEX							
MALE	93.0(0.5)	93.9(0.6)	96.1(0.6)	95.8(0.8)	2.8(0.9)	1.9(1.0)	-0.3(1.0)
FEMALE	91.0(0.6)	92.1(0.6)	95.1(0.7)	96.2(0.8)	5.2(1.0)	4.1(1.0)	1.1(1.1)
RACE/ETHNICITY							
WHITE	95.6(0.3)	96.2(0.3)	98.0(0.4)	97.6(0.3)	2.0(0.4)	1.5(0.4)	-0.4(0.5)
BLACK	70.7(1.7)	76.4(1.5)	85.6(2.5)	92.4(2.2)	21.7(2.8)	16.1(2.7)	6.8(3.4)
HISPANIC	78.3(2.3)	81.4(1.9)	89.3(2.5)	85.8(4.2)	7.4(4.8)	4.4(4.6)	-3.6(4.9)
OTHER	94.5(2.6)	97.2(1.7)	91.9(2.7)	97.9(1.9)	3.4(3.2)	0.7(2.5)	5.9(3.2)
REGION							
NORTHEAST	93.8(0.6)	95.2(0.9)	96.6(0.9)	94.5(1.7)	0.7(1.8)	-0.7(1.9)	-2.1(1.9)
SOUTHEAST	87.6(1.3)	89.2(1.7)	94.1(1.0)	96.2(0.7)	8.6(1.5)	7.0(1.9)	2.1(1.2)
CENTRAL	94.9(0.8)	94.8(0.5)	96.8(0.9)	97.8(0.6)	2.9(1.0)	2.9(0.8)	0.9(1.1)
WEST	90.5(1.1)	91.8(1.0)	94.8(1.1)	95.5(1.0)	4.9(1.5)	3.6(1.4)	0.7(1.5)
TYPE OF COMMUNITY							
EXTREME RURAL	91.4(1.0)	92.1(1.2)	97.0(2.6)	96.7(1.3)	5.3(1.6)	4.6(1.7)	-0.3(2.9)
DISADVANTAGED URBAN	74.2(2.0)	80.7(1.7)	80.7(3.3)	89.0(4.3)	14.8(4.7)	8.4(4.6)	8.3(5.4)
ADVANTAGED URBAN	98.2(0.5)	98.6(0.6)	99.1(0.6)	98.6(0.7)	0.3(0.8)	0.0(0.9)	-0.5(0.9)
OTHER	92.8(0.5)	93.5(0.5)	96.2(0.5)	96.5(0.5)	3.7(0.7)	2.9(0.7)	0.3(0.7)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	82.1(1.1)	83.9(1.4)	88.0(2.1)	90.5(2.5)	8.4(2.8)	6.5(2.9)	2.4(3.3)
GRADUATED H.S.	90.7(0.6)	93.1(0.6)	93.9(1.2)	93.8(1.2)	3.0(1.4)	0.7(1.4)	-0.1(1.7)
SOME EDUC AFTER H.S.	95.5(0.5)	96.2(0.7)	97.9(0.6)	98.5(0.7)	3.0(0.9)	2.4(1.0)	0.6(1.0)
GRADUATED COLLEGE	97.7(0.3)	96.8(0.4)	98.3(0.4)	98.6(0.5)	0.8(0.6)	1.7(0.6)	0.3(0.7)
UNKNOWN	77.2(2.0)	74.7(3.2)	88.0(4.1)	80.1(4.1)	2.9(4.6)	5.4(5.2)	-7.9(5.8)
TYPE OF SCHOOL							
PUBLIC	91.7(0.5)	92.5(0.6)	95.5(0.5)	95.8(0.6)	4.2(0.8)	3.3(0.8)	0.4(0.8)
PRIVATE	97.1(0.6)	98.1(0.5)	99.4(0.5)	98.2(1.2)	1.0(1.3)	0.0(1.3)	-1.3(1.3)
QUARTILES							
UPPER	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
MIDDLE TWO	99.4(0.2)	99.7(0.1)	99.9(0.1)	99.9(0.1)	0.5(0.2)	0.2(0.2)	0.0(0.2)
LOWER	69.1(1.0)	72.5(1.3)	82.5(1.8)	84.5(2.0)	15.4(2.2)	11.9(2.4)	1.9(2.7)

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Percentage of Students with Mathematics Proficiency At or Above Anchor Level 300

	1977-78	1981-82	1985-86	1989-90	DIFFERENCE 1978-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	51.5(1.1)	48.5(1.3)	51.7(1.4)	56.1(1.4)	4.6(1.8)	7.6(1.9)	4.4(2.0)
SEX							
MALE	55.1(1.2)	51.9(1.5)	54.6(1.8)	57.6(1.4)	2.6(1.9)	5.7(2.1)	3.0(2.3)
FEMALE	48.2(1.3)	45.3(1.4)	48.9(1.7)	54.7(1.8)	6.5(2.2)	9.4(2.3)	5.7(2.5)
RACE/ETHNICITY							
WHITE	57.6(1.1)	54.7(1.4)	59.1(1.7)	63.2(1.6)	5.6(2.0)	8.5(2.1)	4.1(2.3)
BLACK	16.8(1.6)	17.1(1.5)	20.8(2.8)	32.8(4.5)	16.0(4.8)	15.8(4.7)	12.1(5.3)
HISPANIC	23.4(2.7)	21.6(2.2)	26.5(4.5)	30.1(3.1)	6.7(4.1)	8.4(3.8)	3.6(5.4)
OTHER	64.7(4.9)	62.0(6.8)	54.9(8.2)	61.6(7.0)	-3.1(8.5)	-0.4(9.8)	6.7(10.8)
REGION							
NORTHEAST	59.2(2.1)	55.6(2.5)	58.9(2.9)	55.7(3.2)	-3.5(3.8)	0.1(4.1)	-3.2(4.3)
SOUTHEAST	42.4(1.9)	41.7(2.6)	45.5(2.0)	49.4(2.8)	6.9(3.4)	7.7(3.8)	3.9(3.4)
CENTRAL	57.1(2.3)	52.0(2.3)	53.9(2.6)	65.3(3.3)	8.2(4.0)	13.3(4.0)	11.4(4.2)
WEST	45.3(2.3)	43.3(2.7)	48.3(4.1)	53.8(2.6)	8.5(3.5)	10.5(3.8)	5.6(4.9)
TYPE OF COMMUNITY							
EXTREME RURAL	44.8(2.3)	40.8(3.0)	53.9(5.7)	55.4(2.8)	10.6(3.6)	14.6(4.1)	1.5(6.4)
DISADVANTAGED URBAN	21.2(2.3)	23.7(2.9)	12.5(2.8)	28.1(5.8)	6.9(6.2)	4.3(6.4)	15.6(6.4)
ADVANTAGED URBAN	75.1(2.1)	73.1(3.5)	71.4(4.0)	69.3(5.2)	-5.8(5.6)	-3.7(6.3)	-2.1(6.6)
OTHER	51.7(1.4)	48.6(1.4)	51.6(1.8)	58.0(1.7)	6.4(2.2)	9.5(2.2)	6.5(2.5)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	26.1(1.4)	23.4(1.6)	21.1(2.9)	29.7(3.4)	3.6(3.6)	6.3(3.7)	8.5(4.4)
GRADUATED H.S.	43.2(1.2)	41.5(1.2)	39.8(1.7)	41.6(1.7)	-1.6(2.0)	0.1(2.0)	1.8(2.4)
SOME EDUC AFTER H.S.	57.5(1.4)	55.8(1.4)	55.4(2.5)	61.0(2.0)	3.5(2.4)	5.2(2.4)	5.6(3.2)
GRADUATED COLLEGE	71.7(1.4)	63.9(1.5)	68.2(2.1)	71.1(1.9)	-0.6(2.3)	7.2(2.4)	2.9(2.8)
UNKNOWN	23.9(2.2)	18.2(2.1)	18.3(4.3)	23.3(5.2)	-0.6(5.7)	5.1(5.6)	4.9(6.8)
TYPE OF SCHOOL							
PUBLIC	50.6(1.2)	46.9(1.3)	50.7(1.6)	55.0(1.3)	4.4(1.8)	8.1(1.9)	4.2(2.1)
PRIVATE	67.7(3.3)	66.3(2.4)	75.1(10.6)	71.0(7.9)	3.3(8.5)	4.7(8.2)	-4.1(13.2)
QUARTILES							
UPPER	97.6(0.4)	98.5(0.4)	99.6(0.3)	99.5(0.2)	1.9(0.5)	1.0(0.5)	0.0(0.4)
MIDDLE TWO	53.1(0.6)	47.3(1.1)	53.1(1.8)	61.5(1.6)	8.4(1.7)	14.2(2.0)	8.4(2.4)
LOWER	2.4(0.3)	1.0(0.3)	1.2(0.6)	2.0(0.7)	-0.3(0.8)	1.0(0.8)	0.8(0.9)

NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 17

Percentage of Students with Mathematics Proficiency At or Above Anchor Level 350

	1977-78	1981-82	1985-86	1989-90	DIFFERENCE 1978-90	DIFFERENCE 1982-90	DIFFERENCE 1986-90
-- TOTAL --	7.3(0.4)	5.5(0.4)	6.5(0.5)	7.2(0.6)	-0.1(0.8)	1.7(0.8)	0.7(0.8)
SEX							
MALE	9.5(0.6)	6.9(0.7)	8.4(0.9)	8.8(0.8)	-0.7(0.9)	1.9(1.0)	0.4(1.2)
FEMALE	5.2(0.7)	4.1(0.4)	4.7(0.6)	5.6(0.8)	0.4(1.0)	1.5(0.9)	0.9(1.0)
RACE/ETHNICITY							
WHITE	8.5(0.5)	6.4(0.5)	7.9(0.7)	8.3(0.7)	-0.2(0.9)	1.9(0.9)	0.4(1.0)
BLACK	0.5(0.2)	0.5(0.3)	0.2(0.3)	2.0(1.0)	1.5(1.1)	1.5(1.1)	1.8(1.1)
HISPANIC	1.4(0.6)	0.7(0.4)	1.1(0.8)	1.9(0.8)	0.4(1.0)	1.1(0.9)	0.8(1.1)
OTHER	15.4(3.2)	9.5(2.7)	10.8(6.4)	15.9(4.3)	0.5(5.3)	6.4(5.0)	5.1(7.7)
REGION							
NORTHEAST	10.3(1.0)	7.3(1.3)	8.9(1.9)	7.3(1.0)	-2.9(1.4)	0.1(1.6)	-1.6(2.1)
SOUTHEAST	5.1(0.5)	4.0(0.7)	4.9(1.1)	6.8(1.8)	1.7(1.8)	2.7(1.9)	1.8(2.1)
CENTRAL	8.4(1.0)	6.9(0.8)	6.6(1.1)	9.3(1.1)	0.8(1.5)	2.4(1.4)	2.7(1.6)
WEST	5.0(0.6)	3.3(0.4)	5.6(1.4)	5.5(1.0)	0.5(1.1)	2.2(1.1)	-0.2(1.7)
TYPE OF COMMUNITY							
EXTREME RURAL	4.4(0.4)	3.7(0.6)	6.5(5.9)	6.5(1.5)	2.1(1.5)	2.8(1.6)	0.0(6.1)
DISADVANTAGED URBAN	0.8(0.3)	1.5(0.6)	0.2(0.3)	2.3(1.6)	1.5(1.6)	0.9(1.7)	2.2(1.7)
ADVANTAGED URBAN	17.2(1.8)	14.0(2.0)	11.8(3.1)	15.0(3.9)	-2.2(4.3)	0.9(4.4)	3.1(5.0)
OTHER	6.8(0.5)	5.0(0.5)	6.2(0.6)	6.8(0.7)	-0.1(0.8)	1.8(0.9)	0.6(0.9)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	1.4(0.3)	1.0(0.4)	0.5(0.5)	1.2(0.8)	-0.3(0.9)	0.1(0.9)	0.7(0.9)
GRADUATED H.S.	3.9(0.3)	3.0(0.3)	2.7(0.6)	2.4(0.6)	-1.5(0.7)	-0.6(0.7)	-0.2(0.8)
SOME EDUC AFTER H.S.	7.4(0.7)	5.9(0.6)	6.9(0.9)	6.7(1.0)	-0.7(1.2)	0.8(1.1)	-0.2(1.3)
GRADUATED COLLEGE	14.1(0.9)	9.6(1.0)	11.0(1.1)	12.5(1.2)	-1.6(1.5)	2.9(1.5)	1.5(1.6)
UNKNOWN	1.4(0.6)	0.7(0.4)	1.0(1.7)	0.4(1.7)	-1.0(1.8)	-0.3(1.7)	-0.6(2.4)
QUARTILES							
UPPER	27.2(1.0)	21.5(1.3)	25.9(1.6)	27.7(1.7)	0.4(2.0)	6.1(2.1)	1.8(2.4)
MIDDLE TWO	1.0(0.2)	0.2(0.1)	0.1(0.1)	0.2(0.2)	-0.8(0.2)	0.0(0.2)	0.1(0.2)
LOWER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
TYPE OF SCHOOL							
PUBLIC	7.0(0.4)	5.2(0.4)	6.1(0.5)	6.5(0.5)	-0.5(0.6)	1.3(0.6)	0.4(0.7)
PRIVATE	12.9(2.7)	8.2(1.4)	16.3(9.1)	15.7(5.3)	2.8(6.0)	7.5(5.5)	-0.6(10.6)

NAEP 1990 MATHEMATICS TRENDASSESSMENT—AGE 9

Mean Proficiencies, Standard Deviations, and Percentiles

	1978	1982	1986	1990
TOTAL SAMPLE				
MEAN	218.6 (0.8)	219.0 (1.1)	221.7 (1.0)	229.6 (0.8)
ST. DEV.	36.0 (0.3)	34.8 (0.4)	34.0 (0.5)	32.9 (0.5)
PERCENTILES				
5	157.1 (1.0)	159.3 (1.8)	163.0 (1.3)	173.3 (2.6)
10	171.1 (1.2)	173.2 (1.8)	176.7 (1.5)	185.8 (2.2)
25	194.6 (1.0)	196.0 (1.1)	199.0 (1.6)	207.8 (1.3)
50	220.1 (1.0)	220.4 (1.2)	223.3 (1.1)	231.1 (0.9)
75	243.7 (0.9)	243.3 (1.4)	245.6 (1.2)	252.5 (0.7)
90	264.0 (1.2)	262.7 (1.0)	264.2 (1.3)	271.0 (1.0)
95	275.7 (1.2)	273.8 (1.3)	275.5 (1.2)	282.1 (1.3)
MALE STUDENTS				
MEAN	217.4 (0.7)	217.1 (1.2)	221.7 (1.1)	229.1 (0.9)
ST. DEV.	36.7 (0.5)	35.8 (0.5)	34.3 (0.8)	33.5 (0.6)
PERCENTILES				
5	154.9 (2.3)	156.4 (2.1)	162.7 (2.0)	171.8 (2.5)
10	169.0 (1.3)	170.2 (1.4)	176.1 (1.7)	184.6 (2.1)
25	192.8 (1.0)	193.0 (1.5)	198.6 (1.6)	206.7 (1.2)
50	218.4 (0.9)	218.6 (1.7)	223.0 (1.0)	230.4 (1.0)
75	243.0 (1.1)	242.3 (1.6)	245.7 (1.6)	252.4 (0.8)
90	263.8 (1.2)	262.2 (1.2)	265.1 (1.9)	271.6 (1.8)
95	275.2 (1.1)	273.6 (1.9)	276.4 (2.1)	282.8 (1.7)
FEMALE STUDENTS				
MEAN	219.9 (1.0)	220.8 (1.2)	221.7 (1.2)	230.2 (1.1)
ST. DEV.	35.3 (0.4)	33.7 (0.5)	33.7 (0.6)	32.4 (0.6)
PERCENTILES				
5	159.4 (1.3)	162.8 (1.7)	163.5 (2.3)	174.5 (2.8)
10	173.1 (2.0)	176.6 (1.6)	177.5 (2.6)	187.0 (2.7)
25	196.4 (1.2)	198.9 (1.8)	199.2 (1.8)	208.9 (1.3)
50	221.5 (1.0)	222.2 (1.1)	223.5 (1.1)	231.8 (1.0)
75	244.3 (1.5)	244.2 (1.4)	245.5 (1.5)	252.7 (1.0)
90	264.2 (1.4)	263.1 (1.0)	263.3 (1.6)	270.4 (1.3)
95	276.1 (1.8)	273.9 (1.7)	274.2 (2.0)	281.4 (1.1)
WHITE STUDENTS				
MEAN	224.1 (0.9)	224.0 (1.1)	226.9 (1.1)	235.2 (0.8)
ST. DEV.	34.0 (0.3)	32.8 (0.4)	32.6 (0.5)	31.2 (0.5)
PERCENTILES				
5	166.3 (1.5)	168.1 (1.4)	170.6 (2.4)	181.8 (2.4)
10	179.4 (1.5)	180.8 (1.7)	183.9 (1.7)	194.0 (1.6)
25	201.4 (1.1)	201.9 (1.3)	205.3 (1.1)	214.6 (0.9)
50	225.1 (1.0)	225.3 (1.4)	228.3 (1.1)	236.3 (1.0)
75	247.7 (0.8)	246.8 (0.9)	249.6 (0.8)	256.4 (0.6)
90	267.0 (1.1)	265.3 (1.0)	267.4 (1.2)	274.5 (0.8)
95	278.4 (1.7)	276.0 (1.3)	278.2 (1.8)	284.8 (2.1)
BLACK STUDENTS				
MEAN	192.4 (1.1)	194.9 (1.6)	201.6 (1.6)	208.4 (2.2)
ST. DEV.	34.5 (0.8)	33.7 (0.8)	31.7 (1.1)	31.5 (0.8)
PERCENTILES				
5	133.7 (1.9)	136.7 (2.5)	146.2 (3.2)	156.0 (1.7)
10	147.0 (1.7)	150.4 (2.3)	158.4 (4.9)	167.1 (3.7)
25	169.3 (1.9)	172.5 (2.0)	180.5 (4.1)	186.0 (4.1)
50	193.0 (1.1)	196.6 (2.0)	202.9 (1.6)	208.4 (3.1)
75	216.4 (1.6)	218.2 (2.0)	223.6 (2.0)	231.4 (2.1)
90	236.1 (1.6)	236.7 (2.5)	241.2 (1.7)	248.9 (2.9)
95	247.5 (1.4)	247.9 (2.8)	251.3 (1.3)	258.9 (4.3)
HISPANIC STUDENTS				
MEAN	202.9 (2.2)	204.0 (1.3)	205.4 (2.1)	213.8 (2.1)
ST. DEV.	35.1 (1.4)	32.8 (1.1)	31.1 (1.9)	30.3 (1.2)
PERCENTILES				
5	144.4 (5.4)	148.1 (2.8)	154.8 (3.7)	161.8 (3.4)
10	156.3 (3.7)	160.8 (3.2)	163.8 (1.8)	173.4 (1.4)
25	178.7 (3.2)	181.3 (2.3)	184.6 (3.2)	193.1 (3.6)
50	204.3 (3.0)	205.2 (1.6)	206.3 (2.4)	216.2 (4.1)
75	227.2 (2.5)	226.5 (2.0)	226.0 (3.8)	235.1 (3.3)
90	249.5 (4.0)	246.4 (3.4)	244.8 (3.8)	251.7 (3.4)
95	259.6 (4.6)	256.6 (2.9)	254.4 (4.6)	262.2 (3.5)

NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 13

Mean Proficiencies, Standard Deviations, and Percentiles

	1978	1982	1986	1990
TOTAL SAMPLE				
MEAN	264.1 (1.1)	268.6 (1.1)	269.0 (1.2)	270.4 (0.9)
ST. DEV.	39.0 (0.5)	33.4 (0.5)	30.8 (0.5)	31.1 (0.5)
PERCENTILES				
5	198.2 (1.6)	212.4 (2.7)	218.3 (1.8)	217.6 (2.2)
10	213.3 (1.5)	225.3 (1.6)	230.0 (1.4)	230.2 (1.4)
25	238.1 (1.3)	246.2 (1.2)	248.3 (1.8)	249.8 (0.9)
50	265.2 (1.1)	269.5 (1.0)	268.7 (1.3)	270.9 (1.0)
75	291.1 (1.1)	291.6 (1.1)	289.6 (1.3)	291.7 (1.0)
90	313.4 (1.2)	310.8 (1.2)	309.2 (1.5)	309.9 (1.0)
95	326.6 (1.3)	322.2 (1.2)	320.5 (2.2)	320.1 (1.6)
MALE STUDENTS				
MEAN	263.6 (1.3)	269.2 (1.4)	270.0 (1.1)	271.2 (1.2)
ST. DEV.	40.1 (0.5)	34.4 (0.7)	31.6 (0.7)	32.4 (0.7)
PERCENTILES				
5	195.8 (1.4)	211.5 (2.2)	218.0 (1.8)	215.5 (2.1)
10	211.4 (1.4)	224.3 (2.0)	229.5 (1.7)	228.6 (2.0)
25	236.7 (1.4)	246.1 (1.5)	248.9 (2.3)	250.2 (1.7)
50	264.8 (1.4)	270.2 (1.2)	270.1 (1.6)	272.0 (1.0)
75	291.5 (1.5)	293.3 (1.2)	291.4 (1.6)	293.1 (1.2)
90	314.4 (1.7)	312.5 (1.5)	310.8 (1.5)	312.4 (1.4)
95	327.5 (1.5)	324.1 (1.3)	322.0 (2.6)	323.1 (1.9)
FEMALE STUDENTS				
MEAN	264.7 (1.1)	268.0 (1.1)	267.9 (1.5)	269.6 (0.9)
ST. DEV.	37.9 (0.6)	32.3 (0.5)	30.0 (0.7)	29.7 (0.5)
PERCENTILES				
5	200.9 (2.6)	213.5 (1.5)	218.5 (3.2)	220.4 (2.3)
10	215.0 (1.6)	226.2 (1.4)	230.6 (2.0)	231.4 (1.2)
25	239.4 (1.4)	246.3 (1.1)	247.8 (1.6)	249.5 (1.1)
50	265.7 (1.2)	268.8 (0.9)	267.4 (1.7)	269.9 (1.2)
75	290.7 (1.0)	290.1 (1.1)	287.8 (1.7)	290.3 (1.3)
90	312.4 (1.4)	308.8 (1.5)	307.2 (2.8)	307.7 (1.5)
95	325.6 (1.2)	320.1 (2.0)	318.5 (2.4)	317.3 (0.8)
WHITE STUDENTS				
MEAN	271.6 (0.8)	274.4 (1.0)	273.6 (1.3)	276.3 (1.1)
ST. DEV.	35.7 (0.5)	31.0 (0.4)	29.4 (0.6)	29.0 (0.5)
PERCENTILES				
5	211.9 (1.4)	223.0 (1.6)	225.7 (1.5)	228.2 (1.5)
10	225.5 (1.4)	234.4 (1.2)	236.5 (1.3)	239.3 (1.0)
25	247.6 (0.9)	253.5 (1.1)	254.1 (1.4)	257.3 (1.1)
50	272.2 (1.0)	274.9 (0.9)	273.3 (1.0)	276.6 (1.0)
75	296.0 (0.7)	295.5 (1.0)	293.2 (1.3)	296.0 (1.1)
90	317.1 (1.2)	313.8 (1.4)	312.1 (2.2)	313.2 (1.3)
95	328.6 (1.3)	324.8 (1.4)	322.9 (1.8)	322.9 (1.6)
BLACK STUDENTS				
MEAN	229.6 (1.9)	240.4 (1.6)	249.2 (2.3)	249.1 (2.3)
ST. DEV.	36.0 (0.6)	31.0 (1.1)	28.3 (1.1)	28.7 (1.2)
PERCENTILES				
5	170.2 (1.9)	189.0 (4.3)	201.7 (4.5)	201.6 (5.4)
10	184.1 (2.6)	200.2 (3.7)	213.2 (2.3)	211.8 (2.2)
25	205.5 (1.9)	219.3 (1.8)	230.7 (2.2)	229.9 (3.0)
50	229.0 (2.2)	241.0 (1.9)	249.3 (2.3)	249.4 (2.0)
75	254.1 (2.2)	260.9 (1.4)	266.9 (1.5)	267.8 (2.9)
90	276.4 (2.4)	279.7 (2.2)	284.4 (3.7)	285.3 (2.8)
95	288.4 (3.9)	291.1 (1.7)	296.4 (4.3)	296.2 (4.1)
HISPANIC STUDENTS				
MEAN	238.0 (2.0)	252.4 (1.7)	254.3 (2.9)	254.6 (1.8)
ST. DEV.	35.2 (1.1)	31.0 (1.0)	29.3 (1.3)	29.9 (1.2)
PERCENTILES				
5	180.2 (1.8)	202.3 (2.2)	205.9 (3.6)	206.2 (3.7)
10	192.5 (2.2)	213.5 (2.6)	216.2 (3.8)	216.4 (3.1)
25	214.3 (1.8)	230.7 (1.9)	235.5 (2.7)	234.3 (2.2)
50	237.4 (2.0)	251.9 (1.4)	254.3 (3.4)	255.1 (1.9)
75	261.9 (3.2)	273.7 (1.4)	274.2 (2.4)	275.2 (3.5)
90	283.7 (3.4)	292.8 (2.4)	291.7 (3.1)	292.2 (2.9)
95	296.3 (3.1)	304.1 (2.9)	301.2 (1.9)	303.3 (3.3)

NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 17

Mean Proficiencies, Standard Deviations, and Percentiles

	1978	1982	1986	1990
TOTAL SAMPLE				
MEAN	300.4 (1.0)	298.5 (0.9)	302.0 (0.9)	304.6 (0.9)
ST. DEV.	34.9 (0.3)	32.4 (0.4)	31.0 (0.5)	31.1 (0.6)
PERCENTILES				
5	241.3 (1.3)	244.9 (1.1)	251.7 (1.2)	253.4 (1.0)
10	254.2 (1.1)	255.9 (1.0)	262.7 (1.0)	264.0 (1.1)
25	276.4 (1.2)	275.8 (1.3)	280.7 (0.6)	282.5 (1.0)
50	301.4 (1.1)	298.8 (1.0)	301.4 (1.3)	304.9 (1.1)
75	325.4 (1.0)	321.5 (0.8)	323.1 (1.9)	326.5 (1.2)
90	344.7 (0.8)	340.6 (0.9)	343.0 (1.3)	344.5 (1.3)
95	355.7 (0.9)	351.2 (1.1)	354.0 (1.1)	355.5 (2.2)
MALE STUDENTS				
MEAN	303.8 (1.0)	301.5 (1.0)	304.7 (1.2)	306.3 (1.1)
ST. DEV.	35.4 (0.4)	32.8 (0.5)	32.0 (0.7)	32.3 (0.7)
PERCENTILES				
5	243.8 (1.2)	247.0 (1.3)	252.7 (3.0)	252.8 (3.0)
10	257.0 (1.2)	257.9 (1.2)	264.1 (1.2)	263.9 (1.2)
25	278.9 (1.2)	278.1 (1.1)	282.3 (1.8)	283.7 (1.3)
50	304.8 (1.3)	301.8 (1.6)	303.9 (1.2)	306.4 (1.6)
75	329.5 (1.1)	325.1 (1.2)	327.8 (2.1)	329.3 (1.1)
90	349.2 (1.0)	344.4 (1.1)	346.7 (1.6)	347.8 (1.4)
95	360.1 (1.0)	354.4 (1.8)	357.5 (1.7)	358.5 (1.3)
FEMALE STUDENTS				
MEAN	297.1 (1.0)	295.6 (1.0)	299.4 (1.0)	302.9 (1.1)
ST. DEV	34.0 (0.4)	31.7 (0.4)	29.9 (0.7)	29.9 (0.9)
PERCENTILES				
5	239.3 (1.3)	242.8 (1.6)	250.3 (2.8)	253.9 (1.9)
10	252.2 (1.0)	254.1 (1.2)	261.2 (1.4)	264.0 (1.5)
25	274.3 (1.3)	273.7 (1.2)	279.3 (1.3)	281.5 (1.3)
50	298.3 (1.1)	296.1 (1.2)	299.1 (1.3)	303.7 (1.7)
75	321.5 (1.0)	317.7 (0.8)	319.8 (1.7)	324.1 (1.2)
90	340.3 (1.4)	336.7 (1.7)	338.2 (2.2)	341.4 (1.6)
95	350.4 (1.5)	347.2 (1.5)	349.3 (1.9)	351.8 (2.2)
WHITE STUDENTS				
MEAN	305.9 (0.9)	303.7 (0.9)	307.5 (1.0)	309.5 (1.0)
ST. DEV	32.3 (0.2)	30.4 (0.4)	29.1 (0.6)	29.5 (0.5)
PERCENTILES				
5	251.9 (0.6)	253.3 (1.1)	261.2 (1.6)	260.2 (1.3)
10	263.3 (1.3)	263.8 (1.1)	270.5 (1.3)	270.5 (1.5)
25	283.5 (1.0)	282.3 (1.1)	286.9 (1.2)	288.8 (1.5)
50	306.6 (1.0)	303.9 (1.2)	306.8 (1.3)	310.1 (1.3)
75	328.9 (0.8)	325.1 (0.9)	327.8 (1.7)	330.1 (1.2)
90	347.3 (0.7)	343.4 (1.1)	346.1 (1.3)	347.2 (1.0)
95	357.8 (0.7)	353.4 (1.5)	356.0 (1.4)	357.1 (1.3)
BLACK STUDENTS				
MEAN	268.4 (1.3)	271.8 (1.2)	278.6 (2.1)	288.5 (2.8)
ST. DEV.	31.8 (1.0)	29.2 (0.7)	26.4 (1.4)	27.9 (1.7)
PERCENTILES				
5	217.2 (2.0)	225.1 (1.4)	236.7 (3.9)	245.4 (4.4)
10	227.8 (1.7)	234.5 (1.7)	244.3 (4.2)	253.5 (3.5)
25	245.7 (1.2)	251.4 (1.6)	259.9 (1.6)	268.7 (1.8)
50	267.7 (1.6)	271.2 (1.4)	278.6 (3.9)	287.1 (2.5)
75	290.5 (2.2)	291.2 (1.7)	296.1 (2.5)	307.1 (5.3)
90	310.3 (2.1)	310.8 (1.7)	312.0 (7.4)	325.7 (5.8)
95	320.7 (2.5)	321.3 (2.2)	324.8 (4.1)	337.7 (4.2)
HISPANIC STUDENTS				
MEAN	276.3 (2.3)	276.7 (1.8)	283.1 (2.9)	283.5 (2.9)
ST. DEV.	32.9 (1.0)	29.3 (1.0)	28.7 (2.0)	31.8 (1.8)
PERCENTILES				
5	224.1 (4.4)	232.0 (1.7)	236.3 (5.3)	229.1 (5.4)
10	234.0 (2.9)	240.7 (3.2)	248.5 (4.5)	242.2 (8.1)
25	253.4 (1.8)	255.8 (2.4)	264.7 (2.8)	263.8 (6.8)
50	275.1 (3.6)	275.3 (3.2)	283.1 (2.5)	281.8 (2.4)
75	298.5 (3.9)	297.1 (2.6)	301.2 (4.2)	304.0 (4.4)
90	319.5 (3.9)	314.9 (2.6)	318.6 (2.3)	325.1 (3.6)
95	332.0 (0.9)	326.7 (4.4)	329.3 (7.3)	336.3 (8.6)

NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 9

Percentage of Students Responding Correctly to Mathematics Trend Items

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Apply concept of probability	1990	39.0(1.3)	40.1(1.7)	37.8(1.9)	40.9(1.7)	29.9(2.5)	34.6(3.4)
	1986	37.1(1.3)	39.4(1.9)	34.5(2.2)	38.3(1.5)	35.9(1.9)	25.4(3.9)
	1982	43.6(1.6)	43.8(2.4)	43.3(1.7)	45.2(1.9)	36.0(3.9)	34.8(3.6)
	1978	42.6(1.3)	45.6(2.0)	39.5(1.9)	45.3(1.4)	29.1(2.8)	36.2(3.6)
Read tally chart	1990	83.1(1.6)	83.2(1.7)	82.9(1.8)	88.2(1.4)	61.6(3.9)	75.6(5.5)
	1986	70.1(1.6)	71.1(1.7)	69.0(2.1)	74.8(1.8)	51.5(4.0)	57.2(8.2)
	1982	63.5(2.2)	63.7(2.1)	63.3(2.9)	68.4(2.2)	38.0(4.1)	57.5(3.8)
Interpret tally chart	1990	80.4(1.7)	79.8(1.9)	81.1(1.8)	83.6(1.4)	66.8(5.0)	73.6(4.2)
	1986	71.6(1.4)	72.3(1.6)	70.7(1.7)	74.5(1.6)	59.7(3.3)	65.2(6.1)
	1982	72.8(1.7)	71.4(2.1)	74.3(1.8)	76.0(2.0)	55.3(2.7)	67.8(4.3)
Interpret tally chart	1990	51.6(1.5)	52.7(2.1)	50.4(1.9)	56.5(1.7)	31.7(3.8)	39.0(3.7)
	1986	44.9(1.7)	46.7(2.1)	43.0(1.8)	49.6(1.9)	27.0(2.3)	29.0(5.6)
	1982	40.0(1.7)	40.6(2.3)	39.3(2.2)	44.4(2.0)	17.7(2.4)	30.5(3.7)
Read data from table	1990	81.3(1.1)	77.1(1.7)	85.3(1.4)	83.4(1.0)	73.8(3.2)	73.2(4.3)
	1986	76.0(1.4)	72.5(2.0)	79.3(1.5)	78.1(1.8)	67.6(3.6)	70.5(5.5)
	1982	76.2(1.3)	75.2(1.9)	77.2(1.3)	78.4(1.1)	65.3(3.1)	69.1(4.5)
	1978	72.8(1.0)	70.0(1.4)	75.5(1.5)	76.0(1.1)	59.7(3.9)	59.0(5.9)
Interpret data in table	1990	44.5(1.5)	43.0(1.6)	46.0(2.3)	49.7(1.9)	27.2(2.9)	28.5(4.3)
	1986	35.8(1.7)	36.3(2.3)	35.4(2.0)	40.1(2.3)	19.4(2.2)	23.3(4.1)
	1982	36.6(2.2)	36.0(2.2)	37.2(2.8)	40.9(2.7)	20.7(2.2)	19.4(3.5)
	1978	36.6(1.4)	37.5(1.7)	35.8(1.6)	39.6(1.6)	26.3(3.2)	23.2(4.9)
Compute using data in table	1990	67.8(1.4)	65.8(2.3)	69.6(1.6)	71.8(1.5)	53.6(4.0)	55.1(4.2)
	1986	60.9(1.9)	58.8(2.2)	62.9(2.0)	64.2(2.3)	47.9(2.4)	46.8(4.9)
	1982	54.9(1.8)	54.1(1.9)	55.7(2.5)	59.3(2.0)	33.4(2.7)	45.1(5.7)
	1978	54.9(1.7)	54.7(1.8)	55.0(2.3)	59.6(1.9)	32.9(3.1)	42.7(8.6)
Read data in bar graph	1990	82.7(1.1)	82.0(1.7)	83.4(1.2)	85.2(1.1)	73.3(3.2)	76.1(4.2)
	1986	75.8(1.2)	74.3(1.7)	77.5(1.3)	77.4(1.3)	71.0(3.0)	72.7(3.9)
	1982	67.0(1.7)	62.6(2.4)	71.2(1.9)	70.5(2.0)	47.8(5.1)	61.6(4.7)
	1978	53.8(1.9)	53.7(2.2)	53.9(2.2)	58.0(2.2)	36.2(3.0)	38.2(3.3)
Interpret data in bar graph	1990	42.1(1.7)	43.0(2.2)	41.2(2.4)	47.2(1.8)	27.6(3.1)	20.8(4.0)
	1986	33.4(1.3)	35.9(1.5)	30.7(1.5)	37.7(1.5)	16.9(2.0)	23.3(4.0)
	1982	26.2(1.9)	26.1(1.7)	26.3(2.7)	28.8(2.3)	16.2(2.0)	11.8(2.4)
	1978	23.9(1.3)	26.3(1.6)	21.4(1.7)	25.7(1.6)	17.3(2.5)	16.5(3.4)
Compute with data in bar graph	1990	55.2(1.7)	56.3(1.9)	54.1(2.3)	59.4(1.7)	39.9(2.8)	40.9(4.0)
	1986	49.1(1.4)	51.7(1.7)	46.3(1.7)	54.7(1.7)	29.3(2.1)	31.7(3.0)
	1982	34.9(1.5)	37.8(2.4)	32.1(2.4)	38.5(1.8)	16.8(1.9)	24.1(5.1)
	1978	28.6(1.5)	29.4(1.9)	27.7(1.9)	31.9(1.8)	16.6(3.1)	11.3(3.6)
Solve time problem	1990	72.4(1.3)	75.7(1.4)	69.1(1.9)	74.5(1.3)	63.0(4.0)	67.5(3.9)
	1986	65.3(1.5)	69.7(1.9)	60.6(1.9)	68.7(1.7)	49.8(2.5)	56.4(5.8)
	1982	57.6(1.5)	58.4(2.2)	56.8(2.1)	61.7(1.8)	36.6(2.5)	47.2(4.4)
Find perimeter of rectangle	1990	20.0(1.2)	23.7(1.8)	16.4(1.3)	21.0(1.3)	14.9(2.4)	18.2(2.6)
	1986	15.8(1.1)	16.6(1.4)	14.9(1.2)	17.5(1.2)	10.3(1.5)	9.8(3.2)
	1982	11.5(1.1)	12.7(1.6)	10.2(1.1)	11.0(1.3)	13.8(2.0)	11.5(2.2)
Find perimeter of rectangle	1990	24.9(1.6)	26.0(2.4)	24.0(1.5)	27.0(2.1)	17.0(2.4)	17.4(4.0)
	1986	18.5(1.2)	20.4(1.6)	16.7(1.2)	19.0(1.5)	16.9(2.5)	10.8(3.2)
	1982	24.8(1.7)	25.6(1.9)	24.0(2.4)	26.9(2.0)	12.9(1.7)	21.3(4.3)
Determine distance on map	1990	14.1(1.0)	14.1(1.4)	14.1(1.2)	13.5(1.1)	15.7(2.2)	14.8(3.0)
	1986	15.7(1.0)	15.5(1.4)	15.8(1.2)	14.8(1.3)	19.8(2.0)	17.1(3.2)
	1982	19.0(1.1)	19.0(1.6)	19.1(1.5)	17.7(1.2)	23.2(2.8)	30.0(2.4)

NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 9

Percentage of Students Responding Correctly to Mathematics Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Understand place value	1990	75.7(1.4)	77.4(1.7)	74.1(1.9)	81.1(1.4)	56.5(4.0)	63.4(4.6)
	1986	70.3(1.4)	71.3(1.8)	69.5(1.7)	75.5(1.5)	50.5(2.3)	50.5(6.0)
	1982	73.0(1.8)	75.1(2.6)	71.0(2.0)	77.1(1.9)	55.3(3.1)	57.2(5.0)
	1978	79.9(1.2)	81.3(1.8)	78.6(1.5)	84.9(1.1)	56.0(3.2)	69.8(4.3)
Identify greatest number	1990	80.5(1.2)	81.0(1.4)	80.1(1.6)	83.1(1.2)	71.0(2.6)	78.5(2.6)
	1986	76.9(1.3)	77.0(1.5)	76.8(1.5)	78.1(1.5)	71.3(2.2)	76.5(3.7)
	1982	75.3(1.4)	73.9(1.3)	76.7(2.1)	77.1(1.5)	66.7(2.3)	69.6(5.0)
	1978	75.1(1.0)	73.1(1.6)	77.0(1.1)	78.2(1.0)	62.6(3.1)	62.5(3.1)
Relate part to whole	1990	29.6(1.8)	30.5(2.3)	28.7(2.3)	30.8(1.9)	26.9(2.8)	25.7(3.4)
	1986	31.5(1.4)	33.0(1.7)	30.0(1.6)	33.6(1.6)	23.9(2.6)	23.5(3.1)
	1982	42.1(1.6)	44.4(2.0)	39.8(2.2)	45.5(2.0)	29.3(1.7)	24.2(4.4)
	1978	44.0(1.4)	43.7(1.5)	44.2(2.0)	46.6(1.5)	34.1(2.6)	30.5(3.9)
Estimate large number	1990	65.3(1.2)	66.9(1.6)	63.6(1.6)	68.8(1.3)	51.7(3.3)	51.8(3.8)
	1986	62.3(0.9)	63.2(1.3)	61.3(1.3)	65.1(1.2)	49.1(2.2)	56.5(4.1)
	1982	63.1(1.7)	62.8(1.8)	63.4(2.2)	65.8(1.9)	50.1(2.9)	53.9(6.0)
Use property of transitivity	1990	76.8(1.2)	73.8(1.4)	79.7(1.5)	79.1(1.3)	68.9(3.1)	69.8(5.3)
	1986	72.6(1.8)	69.7(2.1)	75.3(2.1)	74.7(2.1)	61.7(3.7)	69.2(6.1)
	1982	78.0(1.2)	76.9(1.8)	79.0(1.2)	80.7(1.1)	64.8(3.8)	74.8(5.4)
	1978	73.3(1.2)	69.4(1.4)	77.3(1.7)	75.4(1.4)	68.1(2.5)	54.8(5.6)
Determine age relationship	1990	55.9(1.5)	55.9(1.9)	55.9(2.0)	59.6(1.5)	42.3(4.4)	43.3(2.9)
	1986	54.4(1.1)	57.3(1.3)	51.6(1.9)	57.2(1.4)	40.5(3.3)	55.1(3.7)
	1982	48.2(1.3)	49.2(1.8)	47.4(1.6)	50.6(1.4)	37.5(3.0)	42.5(3.9)
	1978	49.7(1.5)	50.0(1.8)	49.5(2.0)	50.9(1.8)	43.8(2.4)	43.6(8.6)
Identify valid conclusion	1990	65.7(1.2)	64.7(1.9)	66.7(1.9)	68.8(1.7)	57.6(3.4)	50.2(4.7)
	1986	63.4(1.5)	61.8(2.3)	65.0(1.7)	66.1(1.5)	53.3(3.3)	57.7(4.4)
	1982	60.2(1.5)	58.4(2.3)	61.8(1.8)	60.8(1.7)	57.4(2.6)	55.9(4.1)
	1978	66.7(1.5)	65.5(1.9)	67.9(2.1)	67.7(1.5)	60.7(3.3)	66.8(5.0)
Identify valid conclusion	1990	22.9(1.0)	22.9(1.4)	22.8(1.5)	22.7(1.2)	21.4(2.8)	26.6(3.1)
	1986	22.0(0.9)	20.5(1.3)	23.5(1.4)	22.0(1.0)	23.7(2.5)	18.6(2.8)
	1982	23.6(1.3)	24.2(1.7)	23.0(1.8)	24.5(1.5)	20.0(2.7)	21.1(2.1)
	1978	25.1(1.3)	25.5(1.9)	24.7(1.4)	26.3(1.4)	21.2(3.0)	20.1(3.9)
Read Circle graph	1990	83.9(1.4)	82.0(1.7)	85.8(1.6)	86.9(1.3)	75.1(3.9)	73.1(4.6)
	1986	77.6(1.4)	77.4(1.6)	77.7(1.6)	80.5(1.5)	70.1(2.7)	62.3(5.6)
	1982	82.6(1.2)	80.9(1.6)	84.3(1.3)	85.8(1.2)	67.4(2.5)	76.5(6.1)
	1978	74.7(1.5)	72.0(2.0)	77.2(1.6)	78.1(1.4)	56.7(3.3)	68.2(4.0)
Interpret data in circle graph	1990	72.2(1.5)	69.9(1.9)	74.5(1.8)	76.1(1.6)	60.6(3.6)	61.2(3.9)
	1986	60.5(1.8)	57.6(1.9)	63.7(2.0)	63.6(1.8)	50.1(2.9)	49.9(8.1)
	1982	72.8(1.5)	70.2(1.7)	75.4(1.9)	76.0(1.2)	54.6(3.9)	73.0(5.3)
	1978	59.1(1.6)	54.0(2.2)	63.7(1.8)	62.3(1.7)	44.6(3.1)	45.5(5.0)
Estimate weight (metric)	1990	23.0(1.2)	25.6(1.6)	20.6(1.6)	22.6(1.4)	22.2(2.3)	30.6(5.3)
	1986	24.5(1.3)	29.0(1.6)	20.2(1.7)	23.7(1.3)	29.5(3.7)	22.6(4.6)
	1982	37.2(1.7)	38.9(2.0)	35.3(2.3)	35.4(2.0)	45.0(2.5)	40.8(5.1)
Identify greatest metric unit	1990	38.4(2.3)	41.5(2.8)	35.5(2.4)	41.1(2.6)	26.0(2.9)	34.0(4.9)
	1986	28.5(1.8)	32.4(1.9)	24.8(2.2)	30.0(1.9)	22.0(2.8)	23.7(4.9)
	1982	38.5(1.9)	41.0(1.7)	36.1(2.5)	39.5(2.2)	36.6(3.3)	31.2(2.3)
	1978	36.6(1.5)	37.2(1.9)	36.0(2.0)	38.2(1.6)	24.6(1.5)	38.3(4.7)

NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 9

Percentage of Students Responding Correctly to Mathematics Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Read scale	1990	87.2(1.1)	87.0(1.4)	87.5(1.3)	90.7(0.9)	72.1(4.9)	80.3(2.9)
	1986	83.8(1.0)	85.2(1.3)	82.3(1.2)	87.5(1.0)	68.3(2.6)	75.4(3.4)
	1982	79.5(1.2)	79.2(1.4)	79.8(1.5)	84.3(0.9)	57.1(2.8)	70.1(2.8)
	1978	80.3(1.1)	81.1(1.5)	79.5(1.5)	84.1(1.1)	63.4(2.7)	72.0(4.3)
Identify greatest money value	1990	77.5(1.1)	79.8(1.6)	75.3(1.6)	82.1(1.2)	62.5(3.2)	65.6(4.3)
	1986	74.4(1.4)	76.5(1.9)	72.4(1.6)	79.1(1.6)	56.5(3.5)	63.6(5.3)
	1982	74.3(1.5)	76.7(1.6)	72.1(1.8)	78.9(1.4)	54.7(3.1)	57.7(5.4)
	1978	76.0(1.3)	77.5(1.7)	74.5(1.7)	80.5(1.3)	57.3(4.7)	57.8(4.8)
Identify greatest money value	1990	61.6(1.5)	63.8(1.9)	59.5(2.0)	66.6(1.9)	44.0(3.1)	53.3(4.6)
	1986	56.7(1.9)	58.8(2.3)	54.7(2.5)	60.9(1.9)	40.8(4.4)	38.4(4.7)
	1982	57.5(1.5)	59.2(2.3)	55.9(1.9)	62.2(1.5)	37.4(3.1)	38.0(4.5)
	1978	61.4(1.4)	62.3(1.8)	60.5(1.9)	65.5(1.5)	41.9(4.2)	50.0(4.7)
Solve money problem	1990	43.2(1.4)	43.2(1.9)	43.2(1.7)	46.8(1.6)	29.7(3.5)	30.5(3.9)
	1986	37.9(1.3)	37.2(1.7)	38.6(2.0)	42.5(1.6)	21.8(2.7)	22.6(2.3)
	1982	34.2(1.4)	33.8(1.5)	34.6(2.0)	36.5(1.4)	23.3(2.2)	26.8(3.5)
	1978	37.9(1.2)	40.7(1.6)	35.1(1.5)	40.8(1.3)	25.9(2.6)	28.8(5.1)
Solve money problem	1990	35.1(1.9)	35.4(2.0)	34.8(2.3)	38.7(2.1)	21.1(4.2)	23.6(4.0)
	1986	29.9(1.6)	31.6(2.3)	28.3(1.7)	32.7(1.9)	20.3(2.8)	17.9(3.6)
	1982	28.9(1.6)	31.5(1.7)	26.4(2.0)	31.9(2.0)	15.4(2.3)	15.9(3.2)
	1978	31.1(1.6)	31.2(2.0)	31.1(2.0)	34.4(1.8)	17.7(2.4)	20.1(4.0)
Find area of rectangle	1990	9.9(1.4)	9.3(1.4)	10.4(1.9)	10.1(1.6)	7.9(2.1)	5.5(2.1)
	1986	9.2(1.0)	8.6(1.1)	9.8(1.3)	9.6(1.3)	8.4(1.7)	3.5(1.8)
	1982	8.4(1.1)	7.8(1.3)	8.9(1.6)	9.0(1.4)	4.2(1.2)	7.9(3.1)
	1978	3.4(0.5)	3.0(0.5)	3.9(0.7)	3.8(0.6)	2.0(0.6)	2.1(1.5)
Find area of rectangle	1990	33.6(1.5)	34.2(2.0)	33.0(1.8)	35.4(1.7)	29.8(2.9)	19.6(3.6)
	1986	29.3(1.3)	30.6(1.8)	28.0(1.6)	30.1(1.3)	25.8(3.9)	22.1(3.3)
	1982	24.8(1.6)	26.2(2.2)	23.5(1.9)	25.0(1.9)	21.5(3.0)	24.3(4.1)
	1978	27.7(1.4)	26.2(1.7)	29.2(2.1)	28.0(1.6)	26.4(2.7)	22.2(4.6)
Apply property of square	1990	64.8(1.5)	64.4(1.9)	65.2(1.8)	70.4(1.3)	44.6(3.9)	53.8(4.2)
	1986	62.4(1.5)	62.0(1.6)	62.7(2.1)	68.1(1.5)	41.7(2.9)	42.8(4.5)
	1982	64.5(1.7)	63.0(2.0)	66.0(2.1)	69.4(1.9)	41.1(3.1)	54.0(5.4)
	1978	66.4(1.4)	66.4(1.9)	66.4(1.6)	71.6(1.3)	40.3(2.6)	57.6(4.5)
Solve number sentence	1990	94.7(0.7)	94.1(1.0)	95.3(0.9)	95.4(0.6)	92.0(1.9)	93.8(2.1)
	1986	92.3(0.6)	92.0(0.9)	92.7(0.9)	93.9(0.8)	85.1(2.0)	88.5(3.1)
	1982	90.7(0.8)	88.5(1.1)	92.8(0.9)	92.4(0.8)	82.9(2.2)	85.0(3.0)
	1978	92.3(1.1)	91.0(1.6)	93.6(1.0)	94.8(0.8)	78.2(4.5)	90.2(2.6)
Solve number sentence	1990	47.0(1.4)	46.9(2.0)	47.0(1.8)	49.5(1.5)	37.1(2.7)	38.3(4.5)
	1986	50.5(1.8)	51.9(2.1)	48.9(2.0)	52.4(2.1)	44.9(3.3)	40.0(8.6)
	1982	55.9(1.8)	53.9(2.0)	57.9(2.6)	57.9(2.0)	47.0(2.8)	45.5(6.3)
	1978	63.1(1.7)	61.4(1.8)	64.8(2.3)	66.3(1.6)	46.4(4.0)	53.8(8.1)
Understand place value	1990	78.8(1.4)	78.6(1.8)	79.1(1.8)	81.5(1.5)	66.4(3.8)	70.5(3.3)
	1986	72.7(1.5)	71.9(1.7)	73.5(2.0)	74.5(1.7)	68.3(2.3)	62.3(6.8)
	1982	76.6(1.8)	74.7(2.1)	78.7(2.3)	78.3(2.1)	70.0(3.3)	66.4(5.5)
Understand place value	1990	64.6(1.7)	64.6(2.3)	64.6(1.8)	67.9(2.0)	51.1(3.9)	61.8(4.4)
	1986	59.3(1.6)	57.4(2.0)	61.1(1.9)	62.5(2.0)	46.2(4.6)	49.5(4.5)
	1982	63.0(2.1)	61.7(2.3)	64.4(2.5)	65.8(2.5)	50.0(3.3)	50.7(2.8)
Apply multiplication	1990	94.3(0.7)	93.9(0.9)	94.6(1.1)	95.6(0.7)	89.0(1.9)	91.4(2.8)
	1986	91.8(0.6)	92.2(0.9)	91.3(0.7)	93.3(0.7)	87.1(1.8)	88.3(3.2)
	1982	92.7(0.7)	92.0(1.1)	93.4(0.9)	94.4(0.5)	86.2(2.7)	85.8(2.7)

NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 9

Percentage of Students Responding Correctly to Mathematics Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Translate words to numbers	1990	90.0(1.1)	88.6(1.3)	91.4(1.3)	92.4(0.9)	81.4(4.0)	80.0(4.0)
	1986	84.4(1.1)	81.8(1.7)	86.9(1.0)	87.6(1.2)	74.0(2.7)	71.3(4.5)
	1982	87.8(0.7)	84.7(1.1)	91.0(0.7)	89.0(0.7)	80.5(2.2)	86.5(2.7)
Identify true statement	1990	77.2(1.3)	75.9(2.0)	78.5(1.8)	79.4(1.3)	71.9(2.7)	63.6(5.8)
	1986	69.8(1.9)	71.0(1.8)	68.6(2.6)	72.6(2.2)	59.9(3.5)	61.2(7.5)
	1982	75.7(2.1)	74.4(2.4)	77.1(2.1)	78.1(2.4)	68.4(3.0)	60.0(6.0)
Write multiplication sentence	1990	70.6(1.6)	69.7(2.0)	71.5(1.9)	73.0(1.6)	62.1(3.7)	58.7(4.5)
	1986	66.3(1.6)	66.9(1.7)	65.8(2.1)	69.4(2.1)	57.5(2.8)	54.0(5.2)
	1982	67.0(2.1)	63.4(2.1)	70.3(2.8)	71.0(2.3)	48.6(3.1)	54.4(5.8)
	1978	66.6(1.4)	67.1(1.7)	66.1(2.1)	72.0(1.4)	44.5(3.9)	44.4(4.5)
Divide whole numbers	1990	72.3(1.8)	70.3(2.0)	74.3(2.0)	72.3(1.9)	70.9(3.3)	64.7(4.2)
	1986	72.7(1.6)	71.1(1.9)	74.4(1.8)	72.6(1.7)	75.2(3.2)	68.4(7.2)
	1982	74.4(1.3)	72.8(1.7)	76.1(1.6)	76.0(1.7)	65.7(2.5)	70.8(4.8)
	1978	74.2(1.4)	73.4(1.7)	75.1(1.8)	77.2(1.5)	62.1(3.9)	65.2(6.6)
Divide whole numbers	1990	25.9(1.9)	26.5(2.0)	25.4(2.2)	26.6(2.2)	20.9(2.8)	21.2(3.0)
	1986	18.8(1.2)	19.5(1.8)	18.2(1.3)	19.4(1.4)	18.4(4.1)	11.0(4.4)
	1982	14.2(1.5)	14.5(1.5)	14.0(1.9)	14.3(1.8)	11.5(1.6)	14.7(3.6)
	1978	18.7(1.5)	17.6(1.4)	19.8(2.2)	20.1(1.7)	13.3(2.4)	13.7(4.5)
Divide whole numbers	1990	77.3(1.5)	70.8(2.0)	84.0(1.6)	79.0(1.5)	67.0(3.9)	79.3(2.8)
	1986	73.9(1.0)	71.0(1.6)	76.7(1.3)	75.7(1.2)	66.4(2.4)	66.7(5.4)
	1982	77.7(1.8)	74.8(1.7)	80.7(2.6)	79.6(1.8)	67.9(3.6)	73.2(6.6)
	1978	75.5(1.7)	71.7(1.9)	79.6(2.0)	79.0(1.6)	62.1(4.1)	58.9(7.4)
Divide whole numbers	1990	69.3(1.5)	63.9(2.2)	74.9(1.9)	72.3(1.3)	56.0(4.2)	65.3(3.3)
	1986	64.0(1.6)	58.3(2.1)	69.5(1.8)	66.6(1.5)	51.8(4.5)	58.1(6.9)
	1982	67.8(2.1)	63.7(2.4)	71.9(2.4)	70.1(2.6)	52.7(3.2)	66.9(5.6)
	1978	70.2(1.6)	65.9(1.9)	75.0(1.8)	74.5(1.5)	53.9(3.8)	51.8(7.7)
Apply Operation of subtraction	1990	75.9(1.2)	78.1(1.4)	73.8(1.7)	82.7(1.0)	51.7(3.3)	61.9(4.7)
	1986	70.6(1.5)	70.4(2.1)	70.7(1.7)	76.1(1.7)	47.0(3.0)	61.7(6.0)
	1982	71.5(2.1)	73.0(2.2)	70.2(2.5)	77.3(2.3)	47.4(2.8)	50.6(3.5)
	1978	69.5(1.6)	70.7(2.1)	68.2(1.6)	74.5(1.5)	48.6(4.5)	54.0(6.2)
Determine amount of change	1990	83.5(1.0)	85.0(1.4)	82.1(1.3)	86.6(1.0)	71.4(2.9)	74.1(3.7)
	1986	81.2(1.0)	84.7(1.4)	77.4(1.3)	84.2(1.0)	68.3(3.6)	75.9(4.6)
	1982	82.6(1.1)	83.7(1.3)	81.4(1.8)	85.4(1.2)	70.0(4.3)	71.7(3.6)
Add whole numbers	1990	96.6(0.4)	95.7(0.6)	96.5(0.6)	97.4(0.4)	93.8(1.4)	90.8(1.6)
	1986	95.9(0.4)	94.5(0.7)	97.1(0.5)	96.1(0.5)	95.7(0.9)	94.4(1.6)
	1982	89.8(0.9)	89.9(1.4)	89.6(1.1)	90.2(1.0)	86.0(2.3)	91.5(1.4)
Add whole numbers	1990	89.7(0.9)	89.4(1.2)	90.1(1.1)	91.7(0.9)	83.0(2.4)	82.9(3.7)
	1986	86.6(1.0)	83.8(1.2)	89.3(1.2)	88.0(1.1)	79.1(2.6)	86.1(2.6)
	1982	83.8(0.9)	81.8(1.5)	85.9(1.3)	85.8(1.0)	72.9(2.6)	82.2(3.1)
Add whole numbers	1990	53.6(1.5)	50.0(2.0)	56.9(1.7)	56.4(1.7)	41.4(2.7)	46.8(4.0)
	1986	53.1(1.8)	47.4(2.3)	58.4(2.1)	55.6(2.3)	42.3(2.8)	44.2(4.0)
	1982	46.4(1.5)	42.3(1.5)	50.8(2.2)	50.4(1.6)	28.6(3.4)	33.0(4.3)
Add whole numbers	1990	94.3(0.7)	93.3(0.8)	95.2(0.9)	94.4(0.7)	92.7(1.5)	94.3(2.4)
	1986	93.5(0.7)	91.5(0.9)	95.4(0.7)	94.3(0.9)	90.0(1.3)	89.0(2.3)
	1982	94.4(0.6)	93.2(0.8)	95.5(0.8)	95.7(0.7)	89.8(1.6)	87.3(2.5)
Add whole numbers	1990	90.3(0.9)	88.9(1.2)	91.7(1.1)	91.5(0.9)	83.1(2.4)	89.5(2.7)
	1986	90.7(0.8)	90.4(1.0)	91.0(1.2)	92.3(1.0)	85.2(1.6)	86.8(2.1)
	1982	89.4(1.0)	88.9(1.1)	89.9(1.2)	92.5(0.6)	75.5(3.4)	80.9(3.4)

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NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 9

Percentage of Students Responding Correctly to Mathematics Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Add whole numbers	1990	65.1(1.7)	62.3(2.1)	68.0(1.9)	68.9(1.6)	46.9(5.0)	62.4(4.3)
	1986	56.0(1.7)	54.5(1.9)	57.5(2.1)	59.0(1.8)	46.8(3.1)	43.7(4.8)
	1982	54.7(1.9)	53.2(2.2)	56.1(2.4)	59.5(2.1)	34.3(3.2)	34.6(4.5)
Apply operation of addition	1990	91.4(0.9)	90.5(1.3)	92.3(1.0)	92.9(0.9)	86.0(2.7)	86.8(2.7)
	1986	89.9(0.7)	85.8(1.0)	93.8(0.9)	90.1(0.8)	90.2(1.5)	87.0(3.7)
	1982	85.1(0.9)	84.4(1.2)	85.9(1.0)	87.0(0.9)	78.8(2.6)	74.7(3.1)
Add whole numbers	1990	62.9(1.5)	61.1(2.1)	64.6(2.0)	65.0(1.7)	55.5(2.8)	56.8(4.5)
	1986	57.6(1.5)	56.2(2.1)	59.2(1.7)	60.5(1.7)	45.5(3.6)	51.2(6.0)
	1982	65.5(1.4)	64.6(1.9)	66.3(1.7)	68.2(1.5)	48.7(2.9)	64.9(2.8)
	1978	66.2(1.5)	63.7(2.1)	68.6(1.8)	69.1(1.6)	52.9(4.0)	60.5(5.7)
Subtract whole numbers	1990	76.5(1.4)	73.2(1.5)	79.7(2.3)	78.3(1.4)	69.7(4.0)	68.5(4.0)
	1986	75.5(1.3)	75.8(1.3)	75.0(2.0)	77.8(1.6)	66.1(3.4)	71.5(5.8)
	1982	68.4(1.4)	63.2(2.3)	73.6(1.5)	70.8(1.6)	57.6(3.1)	57.1(6.2)
	1978	65.5(2.1)	62.0(2.6)	69.1(2.1)	68.6(2.4)	46.2(3.8)	65.3(6.1)
Subtract whole numbers	1990	54.5(1.7)	52.7(2.2)	56.3(2.0)	57.3(1.6)	42.1(4.6)	46.6(4.9)
	1986	54.3(1.9)	51.9(2.2)	57.0(2.4)	58.0(2.2)	38.3(2.8)	45.3(5.6)
	1982	43.3(2.0)	40.7(2.2)	45.9(2.2)	46.1(2.4)	27.2(2.7)	34.5(7.8)
	1978	42.9(2.2)	39.6(2.5)	46.2(2.6)	47.0(2.5)	21.4(3.1)	34.2(3.3)
Subtract whole numbers	1990	59.2(1.6)	55.8(1.9)	62.6(2.1)	61.9(1.4)	48.7(5.3)	46.8(5.5)
	1986	59.8(1.7)	61.1(1.9)	58.5(2.1)	63.8(1.9)	43.4(2.9)	51.1(7.1)
	1982	48.4(2.1)	44.8(2.2)	52.0(2.6)	50.5(2.5)	36.1(3.1)	41.2(5.6)
	1978	49.4(2.7)	46.8(3.3)	52.0(2.6)	53.2(3.1)	26.7(3.7)	49.3(7.1)
Subtract whole numbers	1990	90.3(1.0)	87.8(1.3)	92.9(1.1)	92.7(0.7)	78.6(2.8)	87.8(2.4)
	1986	89.4(0.8)	87.3(1.3)	91.5(0.8)	92.5(0.8)	79.5(2.3)	78.8(2.4)
	1982	89.2(0.8)	87.1(1.1)	91.3(1.0)	91.8(0.7)	77.1(2.4)	83.2(3.3)
	1978	84.3(1.1)	83.0(1.4)	85.8(1.5)	87.9(1.0)	69.4(3.2)	73.2(4.6)
Subtract whole numbers	1990	87.5(1.1)	84.5(1.8)	90.5(1.1)	90.4(1.0)	75.8(3.8)	77.2(3.2)
	1986	86.3(0.9)	84.2(1.2)	88.4(1.3)	89.2(1.0)	75.6(2.3)	78.5(2.8)
	1982	86.3(1.1)	83.9(1.8)	88.8(1.1)	89.2(1.1)	71.2(2.4)	84.2(2.6)
	1978	79.5(1.2)	77.1(1.6)	82.2(1.4)	83.1(0.9)	63.4(3.9)	70.5(2.7)
Subtract whole numbers	1990	87.2(1.0)	84.5(1.4)	89.9(1.3)	89.0(0.9)	78.4(2.9)	82.9(2.7)
	1986	85.3(1.0)	82.4(1.3)	88.0(1.3)	88.7(1.0)	74.7(3.2)	71.3(2.3)
	1982	85.6(1.0)	83.1(1.4)	88.1(1.2)	88.6(0.9)	69.3(2.1)	81.4(2.5)
	1978	79.8(1.2)	77.8(1.4)	82.1(1.6)	83.7(1.0)	60.4(3.2)	74.4(3.4)
Multiply whole numbers	1990	71.4(1.4)	68.6(1.9)	73.9(1.6)	72.3(1.5)	64.4(2.8)	72.6(4.3)
	1986	64.9(1.7)	61.2(2.3)	68.4(1.6)	66.5(1.7)	62.6(3.8)	47.8(5.0)
	1982	61.0(3.1)	55.5(3.0)	66.5(3.4)	61.9(4.0)	52.9(3.6)	65.7(5.7)
	1978	64.0(1.6)	62.1(1.8)	65.9(2.1)	66.1(1.6)	53.7(3.4)	53.0(8.9)
Multiply whole numbers	1990	16.4(2.0)	15.0(2.0)	17.8(2.4)	17.1(2.3)	13.2(2.3)	9.4(2.8)
	1986	11.5(1.3)	10.3(1.6)	12.7(1.5)	12.1(1.4)	7.6(1.8)	8.0(2.5)
	1982	13.7(1.9)	12.3(1.9)	15.1(2.1)	14.9(2.2)	4.6(1.3)	15.2(5.8)
	1978	8.2(1.1)	7.1(1.1)	9.3(1.4)	9.0(1.3)	4.4(1.5)	6.4(2.6)
Multiply whole numbers	1990	91.1(0.8)	88.7(1.2)	93.5(0.9)	92.5(0.8)	84.5(2.5)	88.4(1.7)
	1986	88.8(1.0)	88.0(1.2)	89.6(1.4)	90.9(1.0)	82.2(2.0)	79.8(3.2)
	1982	87.8(0.9)	85.1(1.2)	90.6(1.0)	90.2(0.8)	76.4(2.6)	81.3(3.4)
	1978	88.7(0.9)	87.0(1.2)	90.6(1.2)	91.0(0.7)	77.3(3.0)	83.8(3.2)
Multiply whole numbers	1990	82.5(1.3)	79.9(1.7)	85.1(1.4)	85.3(1.3)	71.7(2.5)	78.7(3.5)
	1986	82.8(0.9)	81.0(1.6)	84.5(1.1)	85.6(0.9)	71.6(2.6)	78.7(2.8)
	1982	79.9(1.2)	77.7(1.8)	82.0(1.2)	82.7(1.1)	65.9(2.8)	71.4(3.5)

NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 9

Percentage of Students Responding Correctly to Mathematics Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
	1978	79.8(1.2)	76.4(1.4)	83.5(1.7)	82.6(1.0)	65.6(3.6)	74.3(5.7)
Apply place value	1990	71.4(1.5)	73.4(1.6)	69.5(1.8)	78.2(1.6)	46.3(3.4)	57.5(5.3)
	1986	64.8(1.8)	66.4(2.1)	63.2(2.1)	71.2(2.0)	40.9(3.8)	45.7(4.8)
	1982	67.4(2.0)	68.1(2.3)	66.7(2.3)	73.6(1.9)	41.9(3.4)	45.3(5.7)
	1978	62.6(1.7)	65.1(2.1)	60.3(2.0)	68.9(1.6)	33.6(3.8)	41.6(5.3)
Apply place value	1990	47.9(1.8)	51.3(2.4)	44.6(1.9)	54.8(1.8)	25.7(4.0)	27.0(4.3)
	1986	43.1(2.2)	47.8(2.1)	38.1(3.0)	48.5(2.8)	26.9(3.0)	20.0(5.2)
	1982	55.4(1.6)	57.1(2.0)	55.7(2.0)	62.4(1.7)	31.6(2.5)	35.0(4.2)
	1978	51.5(2.0)	55.6(2.4)	47.8(2.5)	57.4(2.0)	24.2(2.5)	32.0(7.9)

NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 13

Percentage of Students Responding Correctly to Mathematics Trend Items

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Understand probability	1990	81.9(1.0)	83.2(1.5)	80.6(1.5)	86.1(0.9)	68.4(3.6)	78.1(3.1)
	1986	81.7(1.1)	81.3(1.4)	82.0(1.5)	85.3(1.2)	66.7(3.9)	72.8(3.9)
	1982	86.2(1.3)	87.4(1.6)	84.9(1.3)	90.0(1.0)	68.0(4.5)	76.7(6.6)
	1978	83.5(1.3)	83.3(1.6)	83.7(1.6)	87.1(1.3)	63.3(2.9)	80.3(3.2)
Read data from table	1990	95.3(0.5)	94.9(0.8)	95.9(0.5)	96.1(0.7)	94.2(1.6)	92.0(2.0)
	1986	94.9(0.5)	94.1(0.6)	95.8(0.7)	95.3(0.6)	92.5(1.1)	94.9(1.4)
	1982	92.6(0.5)	91.9(1.1)	93.2(0.8)	93.4(0.5)	85.1(2.1)	97.8(0.9)
	1978	91.8(0.8)	90.5(1.2)	93.1(1.0)	93.0(0.8)	85.8(3.1)	89.8(3.8)
Interpret data in table	1990	79.5(1.3)	79.1(1.8)	80.0(1.5)	84.3(1.2)	68.2(4.6)	61.1(4.4)
	1986	80.4(1.2)	80.9(1.9)	79.9(1.3)	84.7(1.0)	66.9(3.9)	60.7(3.5)
	1982	76.2(1.6)	74.7(2.5)	77.7(1.9)	79.9(1.5)	59.5(4.4)	65.7(4.7)
	1978	67.4(1.5)	66.4(1.7)	68.5(2.2)	72.6(1.3)	45.3(2.8)	48.5(8.7)
Compute using data in table	1990	92.3(0.7)	91.4(0.9)	93.2(1.1)	93.0(0.9)	91.0(1.6)	89.6(3.2)
	1986	91.3(0.6)	90.0(1.1)	92.5(1.3)	91.6(0.7)	88.8(2.1)	94.5(1.6)
	1982	92.4(0.9)	92.0(1.1)	92.7(0.9)	94.1(0.9)	83.1(1.9)	89.9(1.6)
	1978	87.0(1.0)	86.1(1.2)	87.9(1.3)	89.5(0.9)	74.5(2.9)	79.7(3.5)
Read data in bar graph	1990	89.9(0.7)	86.7(1.3)	93.0(0.8)	90.8(0.7)	87.9(2.8)	82.9(3.3)
	1986	89.6(0.7)	89.0(1.0)	90.2(1.4)	90.1(0.8)	87.7(1.6)	86.8(3.0)
	1982	88.0(0.6)	86.5(0.9)	89.4(1.0)	89.5(0.7)	81.8(2.0)	81.3(2.6)
	1978	85.5(0.9)	83.7(1.4)	87.4(1.3)	87.6(0.8)	74.5(1.9)	80.8(5.0)
Interpret data in bar graph	1990	70.9(1.3)	73.1(1.4)	68.8(2.0)	76.2(1.3)	52.7(4.2)	53.5(6.1)
	1986	69.2(1.7)	71.5(2.2)	67.0(1.9)	73.1(1.7)	54.1(4.2)	55.4(5.3)
	1982	62.4(1.7)	62.6(2.2)	62.1(2.7)	67.6(1.9)	38.6(2.8)	48.9(4.7)
	1978	53.5(1.8)	55.8(2.1)	51.1(1.9)	59.7(1.6)	29.1(1.8)	22.8(5.6)
Compute with data in bar graph	1990	90.9(0.8)	88.5(1.2)	93.2(0.8)	92.4(0.8)	87.0(2.4)	84.8(2.5)
	1986	88.8(0.8)	86.9(1.2)	90.7(1.1)	91.4(0.8)	82.4(2.7)	71.0(5.9)
	1982	85.7(1.0)	86.0(1.8)	85.3(1.4)	88.5(1.1)	71.4(3.9)	79.5(6.1)
	1978	80.5(1.2)	79.6(1.3)	81.3(1.6)	84.0(1.4)	63.7(4.4)	69.4(6.6)
Find perimeter of rectangle	1990	43.2(1.3)	45.2(1.7)	41.1(1.7)	46.5(1.5)	31.7(3.2)	32.0(2.4)
	1986	39.0(2.6)	42.3(3.1)	35.8(2.7)	43.2(3.2)	20.7(2.4)	29.6(5.1)
	1982	38.8(2.0)	41.0(3.0)	36.5(1.9)	42.1(2.4)	22.2(3.6)	26.5(4.6)
Find perimeter of rectangle	1990	54.4(1.8)	59.1(2.0)	50.0(2.3)	56.7(2.0)	41.5(4.0)	52.2(4.5)
	1986	52.6(2.7)	56.3(2.4)	49.0(3.5)	55.3(3.2)	41.6(3.1)	40.1(6.5)
	1982	50.5(1.7)	54.6(1.9)	46.1(2.4)	54.4(1.9)	32.4(4.0)	38.9(3.8)
Use ruler to measure length	1990	54.9(1.6)	61.9(1.6)	48.2(2.3)	62.5(1.5)	22.4(3.0)	39.6(4.0)
	1986	55.1(2.6)	60.5(2.6)	49.6(3.1)	60.7(2.6)	27.9(3.1)	45.8(6.5)
	1982	61.0(1.7)	66.9(2.1)	55.2(2.2)	66.6(1.8)	34.2(3.9)	46.0(7.4)
Apply triangle inequality	1990	71.5(1.1)	74.7(1.6)	68.2(1.5)	72.1(1.4)	69.6(3.0)	68.0(3.7)
	1986	69.1(1.7)	70.2(2.7)	68.0(3.6)	70.6(1.9)	61.1(3.5)	68.4(3.8)
	1982	71.7(1.5)	74.0(2.3)	69.4(2.3)	73.1(1.5)	63.3(3.8)	70.9(4.7)
	1978	64.3(1.2)	65.6(1.5)	63.1(1.8)	65.6(1.4)	58.5(3.9)	56.2(6.1)
Identify a sphere	1990	74.2(1.8)	75.9(2.2)	72.7(1.9)	78.6(1.9)	59.1(4.1)	61.8(4.1)
	1986	73.1(1.5)	74.1(1.8)	72.0(2.0)	76.1(1.6)	59.1(4.7)	65.3(4.7)
	1982	71.3(2.1)	70.9(2.1)	71.6(2.5)	76.1(2.1)	49.1(3.3)	55.8(3.7)
	1978	63.6(2.0)	62.1(2.1)	65.0(2.5)	69.0(2.0)	38.8(3.4)	44.5(6.9)
Identify parallel lines	1990	93.0(0.7)	92.8(0.7)	93.2(1.0)	94.9(0.7)	86.0(2.0)	90.1(1.8)
	1986	93.4(0.7)	92.0(0.9)	94.8(0.9)	95.1(0.6)	88.5(2.2)	85.8(4.7)
	1982	91.4(0.9)	90.7(1.5)	92.0(0.9)	94.1(1.1)	76.9(2.5)	87.9(1.2)
	1978	89.6(1.0)	91.1(1.1)	88.4(1.3)	92.6(1.0)	73.2(3.4)	84.3(2.6)

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Percentage of Students Responding Correctly to Mathematics Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Identify perpendicular lines	1990	35.2(1.7)	34.6(1.7)	35.8(2.3)	38.7(2.0)	21.2(2.6)	25.9(5.5)
	1986	37.9(1.9)	36.3(1.6)	39.5(3.2)	40.2(2.1)	30.0(3.0)	27.1(4.2)
	1982	37.9(1.6)	37.1(2.0)	38.7(2.6)	40.9(1.9)	25.5(2.4)	20.2(4.6)
	1978	33.2(1.9)	32.6(2.1)	33.8(2.4)	35.8(2.2)	23.6(3.2)	18.3(4.0)
Add monomials	1990	27.5(1.9)	25.4(2.0)	29.6(2.1)	30.5(2.3)	16.4(2.4)	15.7(2.3)
	1986	24.7(3.5)	23.3(2.6)	26.0(4.6)	26.6(4.2)	16.8(2.4)	15.3(2.7)
	1982	27.4(1.3)	24.7(1.8)	30.2(2.4)	30.8(1.6)	10.9(1.6)	14.1(3.6)
	1978	25.1(1.4)	23.8(1.7)	26.5(1.7)	28.1(1.6)	12.2(2.4)	12.8(3.9)
Evaluate algebraic expression	1990	79.0(1.4)	79.1(1.9)	79.0(1.7)	83.4(1.2)	68.3(3.7)	62.7(4.9)
	1986	80.8(1.2)	79.5(1.5)	82.1(1.7)	83.8(1.3)	67.5(3.5)	75.5(3.1)
	1982	78.8(1.9)	76.7(2.6)	80.8(1.9)	83.4(2.2)	56.5(3.5)	66.6(2.7)
	1978	69.5(1.9)	64.9(2.1)	74.0(2.5)	74.7(1.6)	49.6(3.8)	42.6(5.6)
Apply transitive property	1990	49.1(1.5)	51.5(1.8)	46.9(2.0)	52.9(1.7)	34.8(3.1)	40.4(3.7)
	1986	43.3(1.3)	43.9(1.8)	42.7(1.7)	46.2(1.6)	29.1(2.5)	33.8(4.2)
	1982	54.6(1.7)	56.1(1.8)	53.0(2.1)	57.4(1.9)	41.4(3.1)	38.7(4.9)
	1978	57.3(1.4)	59.5(1.8)	54.8(1.9)	60.5(1.8)	41.4(3.6)	48.3(3.1)
Identify number line property	1990	46.3(1.7)	45.9(1.8)	46.6(2.5)	49.8(1.8)	30.6(4.0)	37.3(5.4)
	1986	45.8(1.3)	46.7(2.0)	44.9(2.0)	48.6(1.5)	24.6(1.9)	35.8(4.6)
	1982	47.6(1.8)	50.3(2.9)	45.1(2.0)	52.1(1.9)	27.8(3.0)	33.0(6.2)
	1978	52.3(1.6)	54.4(1.7)	50.5(2.2)	57.3(1.6)	28.6(3.5)	37.1(6.2)
Write improper fraction	1990	70.8(1.3)	66.4(1.8)	75.1(1.6)	75.0(1.3)	54.4(5.0)	56.7(3.9)
	1986	69.9(1.9)	66.8(2.1)	73.0(2.4)	73.2(2.2)	55.6(4.1)	55.8(8.8)
	1982	67.3(1.6)	65.0(1.5)	69.7(2.0)	71.3(1.6)	49.8(4.6)	50.7(5.3)
	1978	60.7(2.2)	57.2(2.5)	64.3(2.6)	67.3(2.2)	32.4(4.9)	30.2(3.7)
Find percent greater than 100	1990	48.4(1.1)	51.2(1.5)	45.6(1.5)	51.6(1.5)	37.8(2.1)	33.0(5.8)
	1986	48.6(1.8)	52.0(2.5)	45.1(2.3)	49.9(1.9)	42.5(3.2)	43.5(3.7)
	1982	51.7(1.7)	53.6(1.8)	49.8(2.6)	52.8(1.8)	48.5(3.1)	43.0(6.3)
	1978	49.2(1.3)	52.5(1.5)	45.8(2.0)	50.9(1.4)	40.4(3.7)	46.0(6.2)
Understand concept of percent	1990	42.4(1.9)	47.1(2.2)	37.4(2.2)	48.2(2.1)	26.8(3.7)	28.1(3.6)
	1986	41.4(1.6)	46.3(2.2)	36.5(2.4)	46.0(1.9)	22.9(2.0)	28.5(5.0)
	1982	52.8(2.1)	59.6(2.4)	46.2(2.7)	57.9(2.1)	31.7(2.8)	33.1(3.7)
	1978	47.6(1.5)	52.2(1.7)	42.7(1.9)	51.3(1.4)	31.1(2.6)	34.8(4.4)
Convert decimal to percent	1990	28.4(1.8)	30.0(2.0)	26.7(2.1)	30.3(2.2)	21.6(1.9)	23.5(3.1)
	1986	25.7(2.1)	26.0(1.9)	25.4(2.9)	26.6(2.4)	20.4(2.3)	25.2(6.1)
	1982	31.0(1.7)	32.3(2.0)	29.6(2.4)	31.9(2.1)	22.6(2.5)	37.4(4.5)
	1978	28.6(1.1)	28.6(1.8)	28.6(1.2)	30.2(1.3)	20.0(3.5)	21.6(4.4)
Solve percent problem	1990	41.6(1.7)	45.0(2.2)	38.4(2.1)	45.7(2.0)	26.4(3.3)	29.5(2.9)
	1986	38.7(1.6)	40.6(2.0)	36.9(2.4)	42.2(2.1)	22.2(3.5)	28.3(4.2)
	1982	44.7(1.8)	46.3(2.3)	43.0(2.5)	48.4(1.4)	31.9(4.6)	29.2(4.2)
	1978	38.9(1.6)	42.1(1.9)	35.7(2.1)	41.9(1.7)	22.9(2.6)	29.2(5.6)
Add integers	1990	54.4(1.8)	56.0(2.3)	52.9(2.1)	59.2(2.1)	33.0(3.3)	46.4(6.7)
	1986	51.3(1.8)	52.1(2.0)	50.5(2.8)	54.8(1.7)	34.9(3.9)	38.4(5.2)
	1982	45.4(2.4)	48.8(2.6)	41.9(2.7)	49.7(2.6)	22.4(3.0)	39.2(6.1)
	1978	44.0(2.0)	44.7(2.5)	43.3(2.4)	49.6(2.2)	18.4(3.1)	22.7(5.6)
Solve number sentence	1990	51.6(1.1)	52.6(1.5)	50.5(1.8)	55.2(1.3)	37.1(3.1)	45.2(4.9)
	1986	49.3(1.9)	49.4(2.1)	49.3(3.0)	51.9(2.1)	35.8(3.6)	45.8(4.7)
	1982	36.3(1.5)	38.7(1.8)	33.9(2.0)	37.7(1.7)	28.9(3.3)	31.3(5.5)
	1978	43.7(1.2)	45.6(1.9)	41.9(1.6)	47.7(1.1)	22.1(3.3)	34.9(4.6)

NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 13

Percentage of Students Responding Correctly to Mathematics Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Estimate weight	1990	33.3(1.4)	35.0(1.9)	31.4(1.7)	34.3(1.6)	31.3(3.6)	26.4(4.0)
	1986	34.8(1.5)	36.6(2.1)	32.9(1.8)	36.8(1.9)	23.1(1.9)	36.4(3.8)
	1982	32.5(1.3)	32.6(1.8)	32.4(2.4)	34.7(1.5)	19.0(2.6)	35.1(4.9)
Estimate total weight	1990	38.5(1.2)	39.2(1.3)	37.8(1.5)	42.5(1.4)	27.6(2.8)	28.3(3.4)
	1986	37.1(1.8)	38.5(2.2)	35.7(2.6)	40.5(2.3)	26.1(2.6)	22.7(3.2)
	1982	35.1(1.7)	36.5(2.2)	33.6(2.2)	38.2(1.6)	18.5(2.7)	29.2(3.4)
Estimate cost of pencils	1990	75.9(1.4)	76.7(1.8)	75.2(1.7)	79.6(1.1)	61.9(6.2)	72.5(2.9)
	1986	74.9(1.3)	76.4(1.4)	73.5(1.7)	77.3(1.5)	63.7(2.9)	69.9(4.2)
	1982	58.8(2.1)	60.6(2.9)	56.8(2.3)	63.0(1.9)	38.1(5.1)	47.2(6.0)
Estimate cost using percent	1990	35.0(1.2)	37.5(1.8)	32.3(1.4)	37.8(1.2)	27.2(4.2)	25.6(3.7)
	1986	38.0(1.9)	38.6(2.4)	37.4(2.2)	40.2(2.2)	32.1(3.0)	28.3(3.1)
	1982	38.2(1.2)	40.6(2.3)	35.6(1.5)	41.0(1.3)	27.0(5.0)	29.6(5.9)
Estimate difference in length	1990	61.6(2.0)	62.6(2.2)	60.6(2.7)	65.8(1.9)	47.3(4.5)	51.7(5.3)
	1986	58.8(1.9)	59.4(2.2)	58.3(2.6)	63.1(2.0)	39.6(3.2)	52.3(4.2)
	1982	56.4(1.7)	56.8(2.0)	55.9(2.3)	60.1(2.0)	37.2(2.6)	47.9(6.1)
Use property of transitivity	1990	84.1(1.2)	83.5(1.5)	84.7(1.5)	86.5(1.0)	75.6(4.5)	80.3(2.8)
	1986	85.9(0.8)	84.8(1.3)	86.9(1.1)	87.2(1.2)	79.6(1.9)	83.2(3.3)
	1982	84.8(1.4)	80.9(2.1)	88.6(1.6)	86.4(1.5)	78.2(4.1)	76.5(4.2)
	1978	83.1(1.1)	81.1(1.5)	84.9(1.2)	85.1(1.1)	74.5(3.0)	75.2(4.7)
Determine age relationship	1990	74.9(1.0)	76.3(1.2)	73.6(1.7)	78.3(1.3)	64.8(3.1)	62.2(4.0)
	1986	72.1(1.3)	71.4(1.7)	72.8(1.7)	74.7(1.2)	60.5(4.3)	64.1(3.8)
	1982	75.3(1.5)	77.1(1.5)	73.6(2.3)	79.6(1.6)	54.8(4.2)	63.8(4.4)
	1978	73.5(1.1)	73.0(1.4)	74.1(1.4)	77.3(0.9)	56.7(5.3)	61.7(4.0)
Identify valid conclusion	1990	77.7(1.0)	76.4(1.5)	79.1(1.5)	79.8(1.3)	73.0(3.4)	67.6(2.2)
	1986	75.3(1.4)	73.8(2.2)	76.8(1.5)	76.3(1.6)	72.8(3.5)	65.3(3.2)
	1982	67.6(1.4)	66.0(1.9)	69.2(1.8)	69.4(1.8)	61.9(3.5)	58.0(3.7)
	1978	64.6(1.3)	62.2(1.8)	67.2(1.7)	66.1(1.3)	60.6(3.9)	54.3(3.9)
Identify valid conclusion	1990	28.0(1.3)	30.2(1.6)	25.9(1.6)	28.3(1.3)	25.5(3.7)	28.4(4.6)
	1986	29.8(1.3)	30.8(2.0)	28.9(2.2)	30.3(1.5)	26.0(3.1)	33.3(2.8)
	1982	44.9(1.6)	47.9(2.0)	42.0(2.4)	46.7(1.7)	36.0(2.5)	44.6(3.0)
	1978	50.1(1.6)	53.0(2.0)	46.9(2.2)	53.1(1.6)	39.1(4.0)	32.0(6.9)
Interpret data in table	1990	61.3(1.3)	64.1(1.5)	58.6(1.9)	66.8(1.5)	39.8(3.8)	50.6(4.3)
	1986	60.8(1.9)	63.4(2.2)	58.2(2.3)	64.5(2.2)	42.5(4.0)	61.2(3.2)
	1982	50.2(2.0)	55.1(2.6)	45.3(2.0)	53.5(2.4)	32.3(4.8)	46.1(4.0)
	1978	56.8(1.6)	63.2(1.7)	50.3(2.3)	60.8(1.7)	34.7(2.8)	52.1(3.9)
Read Circle graph	1990	92.5(1.0)	91.3(1.5)	93.8(0.9)	96.1(0.6)	80.5(4.3)	85.7(2.6)
	1986	94.8(0.7)	95.1(0.9)	94.5(0.8)	96.4(0.6)	90.0(1.9)	89.1(5.0)
	1982	94.8(0.8)	94.0(0.8)	95.5(1.0)	95.9(0.9)	90.4(1.6)	87.4(2.7)
	1978	93.3(0.8)	91.2(1.2)	95.5(0.8)	95.4(0.7)	83.5(2.4)	87.7(3.0)
Interpret data in circle graph	1990	86.9(1.2)	85.9(1.7)	88.0(1.2)	89.9(1.2)	77.4(3.9)	82.7(2.4)
	1986	86.2(1.0)	86.2(1.8)	86.1(1.3)	88.5(1.1)	78.2(2.4)	75.7(5.4)
	1982	93.7(0.8)	90.9(1.1)	96.5(0.7)	95.2(0.7)	86.7(2.4)	89.7(2.5)
	1978	90.8(0.8)	89.9(1.2)	91.7(0.9)	93.5(0.7)	78.6(2.7)	80.8(3.2)
Find average	1990	50.5(2.4)	50.8(2.8)	50.1(2.7)	55.1(2.6)	35.5(5.9)	42.0(5.3)
	1986	48.6(2.0)	49.1(2.6)	48.2(2.5)	53.4(2.5)	31.2(3.7)	31.0(4.0)
	1982	52.7(2.2)	52.3(2.7)	53.1(2.4)	56.6(2.0)	36.6(4.0)	33.6(4.3)
	1978	50.6(1.9)	50.6(2.3)	50.6(2.2)	56.4(2.0)	25.0(4.3)	22.5(4.9)

NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 13

Percentage of Students Responding Correctly to Mathematics Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Solve money problem	1990	51.5(1.7)	47.1(2.1)	55.7(1.9)	55.4(1.8)	39.4(3.6)	36.4(4.0)
	1986	43.7(1.7)	40.3(2.2)	47.0(2.2)	48.0(2.0)	24.0(2.3)	28.8(4.4)
	1982	46.6(2.0)	44.4(2.4)	49.3(2.5)	51.8(1.8)	24.7(4.5)	31.6(2.0)
	1978	43.5(2.2)	42.8(2.4)	44.1(2.6)	48.6(2.3)	20.5(2.5)	24.8(4.3)
Identify algebraic identity	1990	41.6(2.2)	39.3(2.7)	44.0(2.3)	46.3(2.5)	27.2(4.9)	26.8(4.4)
	1986	37.6(2.8)	36.4(2.8)	38.8(3.3)	41.2(3.2)	22.8(2.6)	25.9(3.9)
	1982	41.5(1.7)	38.2(2.4)	44.8(2.2)	44.8(2.0)	27.7(3.5)	23.7(3.4)
	1978	35.7(1.8)	32.3(2.2)	39.3(1.9)	39.8(1.9)	19.8(1.9)	16.5(4.9)
Identify unit of length	1990	94.0(0.6)	93.7(0.8)	94.2(0.9)	94.9(0.6)	89.6(2.4)	93.5(2.4)
	1986	91.9(1.1)	92.5(1.3)	91.4(1.1)	93.5(1.3)	86.4(2.3)	84.5(4.2)
	1982	87.5(1.5)	87.7(1.6)	87.4(1.8)	89.9(1.4)	74.5(3.1)	84.9(2.8)
Identify unit of weight	1990	68.9(1.6)	72.3(1.7)	65.7(2.3)	72.0(2.0)	55.8(2.9)	64.8(3.9)
	1986	66.8(1.7)	70.9(1.8)	62.7(2.4)	69.5(1.9)	58.4(4.8)	51.5(4.6)
	1982	70.7(1.6)	73.7(1.8)	67.5(2.5)	75.2(1.9)	46.5(2.6)	64.4(3.0)
Convert metric units	1990	45.2(1.5)	46.0(1.8)	44.5(1.9)	49.2(1.8)	32.1(2.5)	32.6(4.1)
	1986	46.3(4.0)	46.7(4.3)	45.9(4.1)	48.5(5.0)	35.3(3.3)	41.3(4.1)
	1982	49.5(1.4)	52.4(2.1)	46.7(1.3)	49.5(1.7)	50.4(6.6)	47.0(6.7)
Convert metric units	1990	48.8(1.9)	48.5(2.2)	49.1(2.3)	50.7(2.1)	43.7(3.3)	39.2(4.5)
	1986	50.1(2.0)	50.4(2.3)	49.7(2.7)	51.6(2.4)	45.2(3.2)	41.6(5.2)
	1982	37.9(2.3)	39.6(3.2)	36.3(2.2)	38.8(2.3)	36.5(6.0)	27.0(5.7)
Identify greatest metric unit	1990	74.9(1.7)	77.9(2.0)	72.1(1.9)	78.6(1.9)	59.8(3.8)	66.5(5.7)
	1986	71.7(1.6)	77.0(1.9)	66.4(2.2)	75.1(2.1)	60.9(3.9)	52.1(5.4)
	1982	73.7(1.9)	76.8(2.4)	70.6(2.1)	78.2(2.1)	50.6(4.3)	70.6(4.7)
	1978	63.5(1.5)	71.0(2.1)	55.2(1.8)	67.3(1.5)	46.4(3.3)	51.1(4.7)
Estimate height of door	1990	81.0(1.1)	88.0(1.3)	74.4(1.5)	86.5(1.1)	62.4(3.9)	64.7(4.5)
	1986	81.3(1.8)	88.0(1.4)	74.6(2.5)	85.6(2.2)	62.5(2.7)	75.4(2.4)
	1982	76.9(1.5)	82.3(1.9)	71.7(1.9)	80.2(1.7)	64.5(2.9)	61.5(5.5)
	1978	78.8(1.3)	83.2(1.3)	74.5(1.9)	83.8(1.0)	53.2(4.5)	69.4(2.9)
Read length using ruler	1990	82.9(0.9)	83.7(1.1)	82.1(1.3)	86.5(0.8)	70.4(4.4)	72.6(3.0)
	1985	81.0(1.1)	81.4(1.3)	80.5(1.5)	83.4(1.2)	67.9(3.0)	79.0(3.2)
	1982	83.8(1.4)	87.4(1.9)	80.1(2.0)	87.1(1.2)	69.5(4.5)	72.0(2.6)
Find area of rectangle	1990	53.6(1.9)	52.3(2.3)	54.8(2.2)	56.3(2.1)	46.0(3.1)	39.1(5.0)
	1986	51.6(1.9)	50.2(2.5)	53.0(1.9)	53.9(2.2)	44.2(3.7)	34.8(6.1)
	1982	48.4(2.2)	47.2(2.8)	49.5(2.5)	53.1(2.6)	24.4(3.7)	39.9(5.7)
	1978	51.4(2.0)	49.6(2.3)	53.1(2.1)	55.2(2.2)	32.4(3.8)	37.3(4.5)
Find area of rectangle	1990	62.0(2.3)	60.5(2.8)	63.7(2.4)	66.5(2.5)	47.9(4.1)	54.7(3.9)
	1986	63.4(1.7)	64.5(1.8)	62.4(2.6)	65.6(2.1)	52.6(3.3)	58.1(4.1)
	1982	64.0(2.2)	66.3(2.1)	61.8(2.9)	68.0(2.5)	45.1(3.4)	50.2(4.3)
	1978	70.5(1.6)	70.6(1.6)	70.4(2.2)	73.7(1.5)	52.8(4.1)	62.2(5.2)
Find area of square	1990	12.5(1.4)	13.0(1.6)	12.1(1.6)	13.9(1.8)	5.9(2.7)	8.4(1.6)
	1986	13.0(1.5)	15.8(1.6)	10.2(1.6)	14.4(1.7)	5.3(1.6)	7.4(2.4)
	1982	17.7(1.9)	20.2(2.2)	15.3(2.3)	20.5(2.1)	4.3(1.3)	3.4(2.6)
	1978	12.1(1.4)	12.8(1.6)	11.4(1.5)	14.4(1.6)	3.1(1.2)	1.4(0.9)
Identify parallelograms	1990	67.2(1.3)	66.4(1.9)	67.9(1.9)	69.3(1.6)	58.1(3.7)	61.9(4.2)
	1986	67.5(2.1)	69.3(2.3)	65.8(2.2)	70.5(2.8)	51.3(2.8)	62.0(4.5)
	1982	72.3(2.0)	71.8(2.3)	72.9(2.6)	75.6(2.0)	59.5(4.2)	59.4(9.0)
	1978	66.4(1.4)	65.5(1.6)	67.3(1.9)	68.2(1.5)	56.9(3.8)	58.3(5.2)

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NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 13

Percentage of Students Responding Correctly to Mathematics Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Apply vertical angles	1990	81.1(1.5)	81.3(1.7)	80.9(2.0)	84.4(1.3)	71.3(4.5)	72.3(2.8)
	1986	80.4(1.8)	78.2(2.6)	82.7(1.8)	81.6(2.1)	76.6(2.3)	76.2(2.9)
	1982	75.0(1.3)	74.6(1.7)	75.4(1.6)	77.5(1.5)	63.4(2.6)	71.2(3.0)
	1978	72.1(1.3)	71.4(1.8)	73.0(1.6)	74.0(1.4)	60.7(4.9)	69.7(4.7)
Apply supplementary angles	1990	10.6(1.2)	12.8(1.7)	8.4(1.1)	12.1(1.6)	6.7(1.3)	2.3(0.6)
	1986	8.9(1.1)	10.9(1.4)	6.9(1.3)	9.7(1.2)	4.3(1.9)	6.8(2.5)
	1982	12.8(1.6)	16.2(1.8)	9.4(1.6)	13.1(1.7)	12.6(4.0)	9.0(3.2)
	1978	10.3(1.2)	11.7(1.2)	8.9(1.4)	12.1(1.4)	1.4(0.8)	3.5(1.2)
Identify greatest number	1990	58.0(1.8)	59.9(2.3)	56.2(1.9)	63.3(2.1)	36.0(5.8)	45.2(3.7)
	1986	53.4(1.5)	56.2(1.7)	50.6(2.0)	58.9(1.6)	31.2(2.5)	34.4(5.5)
	1982	54.7(1.8)	56.0(2.5)	53.3(2.2)	58.5(1.5)	37.3(6.2)	38.9(5.8)
Change decimal to percent	1990	63.3(1.5)	62.4(1.7)	64.2(1.7)	65.4(1.6)	48.5(3.3)	68.8(3.9)
	1986	65.2(1.8)	64.5(2.1)	65.9(2.3)	66.7(1.9)	55.1(3.6)	68.6(3.4)
	1982	68.4(1.4)	65.1(1.8)	71.7(1.7)	69.4(1.5)	61.3(4.5)	68.2(5.1)
Write addition sentence	1990	28.9(1.4)	29.6(1.6)	28.2(1.6)	31.3(1.6)	18.5(2.8)	22.1(3.4)
	1986	31.8(1.7)	30.2(1.9)	33.4(1.9)	34.1(1.8)	19.6(3.9)	27.3(4.5)
	1982	46.5(2.5)	46.3(2.9)	46.6(2.9)	49.8(2.5)	30.1(6.8)	31.6(7.1)
	1978	48.2(1.5)	46.4(1.8)	50.2(2.3)	53.4(1.5)	25.4(6.0)	26.5(4.0)
Find common factor	1990	83.8(1.3)	81.1(1.7)	86.4(1.6)	86.5(1.2)	77.9(4.0)	71.6(5.4)
	1986	84.3(1.1)	84.1(1.3)	84.6(1.5)	85.4(1.2)	82.8(2.0)	77.2(3.0)
	1982	79.5(1.3)	78.3(1.6)	80.6(1.5)	81.1(1.4)	75.5(2.8)	68.1(4.2)
	1978	72.5(1.4)	72.9(1.7)	72.2(1.8)	75.3(1.5)	61.4(2.7)	62.9(4.6)
Add whole numbers	1990	97.1(0.3)	97.1(0.6)	97.1(0.4)	97.2(0.3)	97.1(1.4)	96.3(1.2)
	1986	96.2(0.5)	96.1(0.5)	96.3(0.7)	96.6(0.6)	94.0(1.8)	96.2(0.8)
	1982	96.3(0.5)	95.9(0.7)	96.6(0.5)	96.2(0.6)	95.9(1.0)	97.1(1.4)
Add whole numbers	1990	96.6(0.4)	96.1(0.8)	97.0(0.5)	96.8(0.3)	96.0(1.7)	94.4(1.8)
	1986	95.3(0.6)	94.5(0.8)	96.1(0.9)	95.4(0.7)	94.4(1.2)	96.3(1.4)
	1982	96.4(0.5)	95.2(0.8)	97.7(0.4)	97.7(0.4)	89.7(1.3)	94.2(1.8)
Add whole numbers	1990	81.6(0.8)	79.1(1.4)	84.0(1.1)	82.4(0.9)	77.1(2.9)	79.1(3.6)
	1986	81.3(1.6)	80.1(2.0)	82.5(1.8)	82.0(1.7)	77.6(3.3)	78.4(4.1)
	1982	85.7(1.0)	83.7(1.3)	87.8(1.3)	87.1(1.1)	78.2(2.2)	82.6(2.5)
Add whole numbers	1990	98.1(0.2)	97.8(0.4)	98.3(0.4)	98.0(0.3)	98.2(0.8)	98.4(0.8)
	1986	97.8(0.4)	97.5(0.5)	98.0(0.6)	97.7(0.5)	98.1(0.6)	97.2(1.2)
	1982	97.1(0.5)	96.7(0.8)	97.5(0.7)	97.6(0.4)	94.1(1.7)	96.7(2.4)
Add whole numbers	1990	98.0(0.4)	97.5(0.6)	98.4(0.4)	98.3(0.4)	97.2(1.0)	96.2(1.4)
	1986	97.6(0.3)	96.9(0.8)	98.2(0.6)	97.6(0.4)	97.6(0.8)	95.9(1.6)
	1982	97.9(0.4)	97.7(0.6)	98.1(0.5)	98.2(0.3)	96.1(1.5)	97.5(1.4)
Add whole numbers	1990	92.5(0.7)	90.1(1.0)	94.8(0.8)	93.5(0.6)	89.5(2.2)	87.1(3.5)
	1986	89.6(1.0)	87.2(1.9)	92.0(0.8)	91.1(1.2)	82.3(1.2)	87.0(3.3)
	1982	87.9(1.6)	83.9(2.4)	92.1(1.3)	91.1(1.0)	70.9(6.0)	87.5(3.0)
Apply operation of addition	1990	96.0(0.4)	95.2(0.7)	96.7(0.5)	96.3(0.4)	95.5(1.3)	94.1(1.4)
	1986	96.5(0.5)	95.9(0.7)	97.1(0.7)	96.8(0.7)	96.2(0.9)	93.4(1.7)
	1982	97.6(0.3)	97.8(0.4)	97.5(0.6)	97.9(0.4)	97.0(1.2)	96.7(1.4)
Subtract whole numbers	1990	94.9(0.5)	93.1(1.0)	96.7(0.6)	95.3(0.5)	93.7(1.8)	90.9(2.1)
	1986	94.7(0.5)	93.5(1.0)	95.9(0.4)	95.2(0.7)	93.5(1.9)	91.0(2.5)
	1982	95.4(0.5)	94.6(0.9)	96.1(0.7)	96.8(0.5)	87.0(2.3)	95.3(1.2)
	1978	92.1(0.7)	91.5(0.9)	92.6(1.0)	94.2(0.7)	79.9(1.8)	92.0(1.8)

NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 13

Percentage of Students Responding Correctly to Mathematics Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Subtract whole numbers	1990	81.7(1.1)	80.0(1.6)	83.4(1.5)	84.5(1.3)	68.7(2.9)	79.5(3.8)
	1986	82.8(1.1)	80.8(1.2)	84.7(1.9)	84.0(1.1)	75.9(3.4)	79.5(3.9)
	1982	86.3(1.2)	85.1(1.6)	87.4(2.0)	89.5(1.3)	70.8(3.2)	77.8(3.6)
	1978	80.6(1.2)	80.4(1.4)	80.8(1.6)	83.8(1.3)	63.0(3.5)	77.3(2.7)
Subtract whole numbers	1990	88.2(0.9)	87.1(1.3)	89.3(1.4)	89.7(0.9)	81.3(3.3)	85.2(2.3)
	1986	87.8(1.6)	86.1(1.7)	89.5(2.1)	89.7(1.7)	79.2(2.6)	83.7(2.2)
	1982	88.0(1.1)	85.9(1.5)	90.1(1.3)	90.3(1.2)	74.0(3.2)	91.1(2.2)
	1978	84.7(0.9)	83.7(1.2)	85.7(1.6)	87.6(0.9)	70.9(2.9)	76.6(3.3)
Subtract whole numbers	1990	95.1(0.6)	94.7(0.7)	95.6(0.8)	96.3(0.5)	92.3(2.5)	90.5(1.4)
	1986	95.4(0.6)	95.5(0.6)	95.3(1.1)	96.0(0.7)	91.7(1.4)	96.2(1.4)
	1982	96.2(0.7)	95.3(0.9)	97.0(0.7)	96.9(0.7)	92.3(1.5)	94.9(2.3)
	1978	95.8(0.6)	94.8(0.9)	96.8(0.6)	96.9(0.7)	89.4(1.3)	95.8(1.6)
Subtract whole numbers	1990	95.7(0.6)	94.8(0.7)	96.7(0.8)	96.2(0.5)	95.3(1.5)	91.2(1.7)
	1986	96.8(0.6)	96.5(0.7)	97.0(0.7)	97.4(0.6)	93.3(1.3)	96.0(1.9)
	1982	96.1(0.6)	94.5(0.9)	97.8(0.7)	96.2(0.7)	94.7(1.3)	97.3(2.0)
	1978	94.9(0.4)	93.3(0.8)	96.6(0.6)	95.8(0.5)	89.5(1.7)	94.3(1.7)
Subtract whole numbers	1990	91.9(0.9)	91.2(1.3)	92.5(0.9)	93.1(0.8)	87.2(2.8)	89.4(2.5)
	1986	92.9(0.8)	92.3(1.0)	93.6(1.1)	94.3(0.9)	86.9(1.5)	90.2(2.6)
	1982	93.7(0.8)	93.6(1.2)	93.9(1.1)	94.8(0.7)	86.5(2.6)	95.3(2.1)
	1978	91.5(0.7)	90.1(1.0)	92.9(0.8)	93.8(0.6)	80.6(2.5)	85.4(2.5)
Find percent given numbers	1990	49.0(1.9)	56.7(2.2)	40.8(2.3)	54.5(2.0)	29.4(3.4)	42.4(3.3)
	1986	47.8(1.8)	55.4(2.6)	40.2(2.4)	53.1(2.0)	23.7(1.9)	37.3(5.1)
	1982	50.8(1.8)	55.6(2.1)	45.6(2.0)	56.1(1.6)	25.8(3.1)	40.0(3.1)
Find percent of number	1990	35.7(1.5)	39.3(1.9)	31.9(1.6)	38.8(1.8)	25.4(2.6)	27.2(3.5)
	1986	33.1(2.2)	36.2(2.6)	30.1(2.1)	35.1(2.6)	25.5(3.6)	24.4(3.8)
	1982	32.8(1.3)	36.1(1.6)	29.4(2.2)	34.0(1.6)	26.0(3.6)	29.2(3.1)
Find percent greater than 100	1990	31.9(1.9)	37.0(2.4)	26.5(2.0)	35.1(2.2)	22.7(3.0)	22.0(3.6)
	1986	30.3(1.4)	36.4(1.8)	24.2(2.3)	32.8(1.7)	19.6(2.2)	21.6(4.7)
	1982	29.0(1.7)	33.4(2.0)	24.3(2.1)	31.4(1.8)	17.0(3.4)	22.3(3.3)
Find percent given numbers	1990	24.4(1.2)	28.6(1.5)	20.4(1.4)	27.5(1.3)	11.4(2.2)	18.9(4.4)
	1986	25.6(1.6)	28.6(1.8)	22.5(3.9)	27.7(2.0)	17.3(2.4)	17.2(3.0)
	1982	22.6(1.2)	26.7(1.8)	18.2(1.6)	24.1(1.4)	15.3(3.3)	28.0(2.1)
Find percent given numbers	1990	46.0(1.7)	50.9(1.6)	41.3(2.2)	52.1(1.7)	23.4(3.6)	33.3(5.0)
	1986	38.9(1.8)	42.7(2.2)	35.1(3.0)	43.2(2.1)	16.8(2.7)	28.4(3.2)
	1982	41.2(2.3)	46.1(3.3)	36.0(2.3)	46.0(1.9)	20.9(4.4)	26.0(3.6)
Find percent of number	1990	34.5(1.4)	38.1(1.6)	31.0(1.8)	37.0(1.5)	21.1(2.8)	27.8(3.5)
	1986	33.4(1.1)	37.9(1.7)	29.0(1.5)	34.8(1.4)	24.7(2.4)	30.9(4.2)
	1982	32.8(1.4)	32.5(2.0)	33.2(1.6)	34.7(1.6)	24.7(4.0)	21.2(5.1)
Find percent greater than 100	1990	29.1(1.3)	33.3(1.7)	25.0(1.7)	31.4(1.6)	19.0(3.0)	23.7(3.0)
	1986	27.7(1.0)	30.1(1.6)	25.5(1.8)	29.0(1.4)	19.2(1.9)	21.7(3.7)
	1982	26.5(1.4)	29.4(2.1)	23.5(1.7)	28.1(1.6)	18.9(3.1)	22.0(2.9)
Find percent given numbers	1990	24.9(1.2)	26.6(1.7)	23.3(1.2)	26.3(1.3)	17.0(2.9)	20.6(3.4)
	1986	24.0(2.0)	25.1(1.5)	23.0(3.0)	24.8(2.5)	17.0(2.4)	23.4(2.8)
	1982	24.0(1.3)	24.9(2.2)	23.1(1.6)	25.6(1.5)	16.0(3.3)	13.1(2.1)
Find number given percent	1990	26.2(1.2)	26.2(1.4)	26.1(1.7)	27.7(1.4)	17.5(2.1)	23.6(2.8)
	1986	24.6(1.3)	24.8(2.0)	24.5(1.8)	25.0(1.6)	20.8(2.4)	25.3(3.3)
	1982	20.8(1.0)	20.0(1.3)	21.6(1.9)	21.5(1.1)	17.9(1.8)	19.2(5.2)

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NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 13

Percentage of Students Responding Correctly to Mathematics Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Subtract decimals	1990	86.3(0.8)	86.2(1.3)	86.4(1.1)	88.4(0.7)	79.6(3.0)	82.8(4.0)
	1986	82.6(0.9)	82.6(1.5)	82.7(1.7)	85.3(1.1)	69.9(3.8)	77.9(2.8)
	1982	77.0(2.1)	73.3(3.8)	80.9(1.5)	81.0(2.1)	54.4(***)	75.1(3.9)
	1978	80.1(1.3)	80.0(1.6)	80.3(1.5)	83.6(1.2)	61.8(4.3)	74.0(4.2)
Divide decimals	1990	56.9(1.3)	52.0(1.7)	61.7(1.8)	60.4(1.5)	45.1(3.7)	45.0(3.6)
	1986	52.4(2.2)	47.9(1.9)	56.9(3.3)	58.1(2.6)	28.5(2.9)	37.2(4.1)
	1982	44.1(1.9)	39.9(2.6)	48.5(2.3)	49.7(2.0)	20.5(4.5)	24.5(3.9)
	1978	54.5(1.9)	50.0(2.1)	58.9(2.3)	59.2(1.8)	28.6(3.8)	46.6(5.8)
Add decimals	1990	79.5(1.0)	73.3(1.3)	85.3(1.3)	82.2(1.1)	67.4(3.9)	74.6(3.3)
	1986	74.1(1.4)	69.1(2.0)	79.0(2.0)	77.8(1.6)	55.6(3.2)	66.1(3.3)
	1982	72.5(2.1)	67.2(3.2)	78.2(2.1)	77.8(1.7)	48.8(6.4)	59.7(5.1)
	1978	76.8(1.7)	72.8(2.1)	80.7(1.8)	79.8(1.8)	59.8(4.0)	74.5(3.4)
Divide decimals	1990	61.8(1.3)	55.9(1.4)	67.5(1.8)	64.9(1.5)	50.6(3.7)	49.7(3.6)
	1986	58.0(2.2)	53.3(2.4)	62.7(2.4)	63.2(2.7)	34.4(3.9)	48.8(4.8)
	1982	58.0(1.7)	50.0(2.0)	66.4(2.3)	61.6(1.7)	39.3(3.9)	56.8(7.3)
	1978	64.0(1.8)	58.5(2.4)	69.4(2.0)	67.1(1.8)	44.5(3.8)	65.2(4.1)
Subtract decimals	1990	57.4(1.8)	49.8(1.8)	64.8(2.4)	59.7(2.1)	50.4(4.0)	48.5(4.0)
	1986	51.3(3.0)	45.7(3.0)	56.9(3.3)	55.2(3.7)	34.1(3.9)	40.4(5.8)
	1982	40.1(1.6)	30.9(1.6)	49.7(2.3)	43.6(1.5)	23.1(3.9)	32.4(5.5)
	1978	43.9(1.6)	38.1(2.2)	49.6(2.1)	47.2(1.5)	28.5(3.5)	32.6(3.7)
Divide decimals	1990	43.4(1.7)	38.3(2.0)	48.3(2.1)	46.1(2.1)	33.5(2.5)	30.5(3.6)
	1986	37.1(2.5)	32.4(3.1)	41.6(2.3)	40.3(2.9)	24.1(3.7)	26.9(4.3)
	1982	29.9(1.4)	21.2(1.8)	39.2(1.8)	31.6(1.5)	21.8(4.9)	25.2(2.8)
	1978	41.8(1.8)	36.0(1.9)	47.4(2.3)	45.0(2.0)	26.0(4.5)	32.2(2.7)
Estimate total cost	1990	22.9(1.3)	25.1(1.8)	20.5(1.5)	24.4(1.5)	20.3(2.8)	15.0(2.7)
	1986	23.6(1.4)	27.1(2.5)	20.1(1.5)	25.0(1.8)	15.1(1.6)	24.3(2.4)
	1982	19.3(1.2)	20.5(1.6)	18.1(1.6)	21.3(1.5)	11.6(2.0)	9.4(3.9)
Identify even number	1990	96.2(0.4)	95.7(0.6)	96.6(0.6)	97.1(0.3)	93.8(2.0)	89.9(1.6)
	1986	95.3(0.8)	94.6(0.9)	96.0(1.0)	96.5(0.9)	91.0(1.4)	90.7(3.3)
	1982	95.9(0.6)	95.9(0.7)	95.9(0.9)	97.4(0.6)	90.7(2.0)	87.0(5.4)
	1978	92.9(0.8)	93.0(1.0)	92.8(1.0)	95.4(0.6)	81.8(2.1)	83.5(2.9)
Identify even number property	1990	49.2(1.7)	51.2(2.3)	47.1(2.0)	53.3(2.1)	35.8(3.2)	38.8(3.2)
	1986	48.5(1.8)	51.7(2.4)	45.3(1.6)	51.0(2.1)	35.6(3.9)	44.0(2.4)
	1982	58.4(1.8)	58.2(2.0)	58.5(2.1)	60.9(2.1)	45.2(2.8)	53.8(6.8)
	1978	54.6(1.6)	52.6(2.1)	56.5(2.1)	58.3(1.8)	37.8(3.0)	40.7(3.5)
Identify even number property	1990	72.0(1.5)	70.0(1.6)	73.9(2.0)	76.8(1.4)	54.8(4.8)	61.8(3.6)
	1986	70.1(1.1)	68.8(1.7)	71.5(2.2)	72.9(1.4)	59.0(4.2)	60.8(3.8)
	1982	76.8(1.4)	75.1(2.1)	78.5(1.8)	80.8(1.2)	60.6(4.0)	61.5(4.9)
	1978	70.9(1.6)	68.4(2.1)	73.4(1.8)	75.7(1.5)	48.4(3.7)	55.8(4.2)
Understand percent less than 1	1990	23.3(1.1)	25.9(1.4)	20.8(1.4)	24.3(1.3)	20.5(2.3)	17.1(2.2)
	1986	22.5(1.4)	22.4(1.3)	22.6(2.0)	24.1(1.7)	13.5(2.2)	21.2(2.8)
	1982	17.1(1.1)	16.7(1.7)	17.4(1.9)	17.6(1.3)	15.0(2.8)	12.3(3.5)
	1978	19.0(1.2)	19.2(1.5)	18.8(1.5)	19.6(1.4)	15.4(2.1)	16.9(2.7)
Identify expected value	1990	57.4(1.6)	62.4(1.9)	52.2(2.1)	63.1(1.7)	34.8(3.7)	48.7(3.5)
	1986	54.9(1.9)	59.1(2.0)	50.8(3.5)	58.9(2.5)	38.8(2.5)	46.0(3.2)
	1982	65.6(1.8)	69.8(2.3)	61.3(2.2)	69.3(1.9)	46.2(3.3)	62.5(2.8)
	1978	64.8(1.3)	69.2(1.3)	60.4(2.1)	68.2(1.6)	51.8(2.4)	49.8(2.9)

NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 13

Percentage of Students Responding Correctly to Mathematics Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Identify number sentence	1990	78.4(1.0)	77.0(1.4)	79.7(1.4)	81.1(1.1)	68.1(3.0)	68.3(2.4)
	1986	75.7(2.3)	77.3(2.1)	74.1(3.1)	78.5(2.7)	64.4(3.6)	67.7(4.4)
	1982	80.4(1.1)	79.8(1.8)	81.1(1.3)	84.9(1.0)	56.7(2.8)	73.7(3.9)
	1978	81.5(1.1)	81.5(1.3)	81.5(1.3)	85.4(1.0)	64.9(2.8)	65.1(4.0)
Understand decimal place value	1990	44.2(1.6)	47.3(1.8)	41.2(2.2)	48.9(1.8)	25.3(3.3)	29.0(4.0)
	1986	40.5(1.9)	42.2(1.6)	38.8(3.7)	44.3(2.1)	22.2(2.7)	32.5(4.6)
	1982	46.6(2.2)	46.3(2.7)	47.0(2.3)	52.4(2.6)	21.1(2.9)	24.7(3.3)
	1978	37.4(1.5)	39.2(1.7)	35.7(2.0)	40.9(1.7)	20.6(2.0)	22.8(4.7)
Divide integers	1990	30.4(1.6)	25.5(1.6)	35.2(2.3)	30.3(2.0)	29.8(3.6)	28.2(3.1)
	1986	28.5(2.8)	27.7(2.4)	29.4(3.8)	29.8(3.3)	25.4(3.6)	15.9(4.1)
	1982	30.0(1.7)	27.8(2.1)	32.3(2.2)	31.8(2.1)	23.1(3.0)	19.1(2.7)
	1978	30.2(2.1)	27.4(2.1)	33.0(2.6)	33.0(2.4)	17.3(2.9)	18.8(2.5)
Divide integers	1990	23.2(2.1)	21.6(2.5)	24.9(2.0)	24.4(2.3)	20.8(4.3)	16.0(2.6)
	1986	21.8(2.3)	20.5(2.2)	23.0(3.0)	23.9(2.7)	13.7(2.2)	7.7(1.9)
	1982	26.9(1.7)	24.7(2.1)	29.1(2.4)	28.6(1.9)	19.9(3.3)	18.8(3.9)
	1978	28.5(1.9)	26.2(2.3)	30.8(2.2)	30.6(2.2)	21.6(3.3)	15.8(6.9)
Convert fraction to decimal	1990	61.4(2.0)	60.4(2.7)	62.4(1.8)	66.8(1.9)	44.0(6.2)	47.8(4.5)
	1986	59.3(1.6)	57.3(2.0)	61.3(1.7)	62.6(2.1)	44.6(3.9)	53.6(6.5)
	1982	62.9(2.3)	60.3(2.7)	65.5(2.6)	66.9(2.8)	41.5(3.8)	53.6(5.9)
	1978	54.7(2.1)	53.6(2.4)	55.7(2.6)	61.0(2.1)	27.8(3.4)	29.5(5.7)
Convert fraction to decimal	1990	62.0(1.7)	61.9(2.5)	62.1(1.6)	67.0(1.8)	44.7(4.9)	54.0(4.2)
	1986	62.5(1.6)	59.7(2.2)	65.2(2.1)	67.4(2.2)	42.1(3.2)	49.0(4.9)
	1982	68.4(2.0)	64.5(2.5)	72.3(2.4)	72.5(2.3)	45.2(3.8)	65.8(5.6)
	1978	54.3(1.9)	53.4(2.1)	55.2(2.3)	59.8(1.8)	28.0(3.3)	37.3(5.4)
Convert fraction to decimal	1990	33.0(2.0)	35.0(2.8)	30.8(1.7)	38.1(2.1)	13.6(3.5)	23.7(4.0)
	1986	34.3(1.3)	35.6(1.8)	33.0(2.0)	38.1(1.8)	17.8(2.1)	22.5(3.2)
	1982	40.2(1.6)	40.4(2.5)	40.0(2.0)	44.5(2.0)	18.5(3.5)	28.9(4.8)
	1978	40.2(2.0)	41.4(2.0)	39.0(2.8)	45.9(2.0)	12.8(2.2)	23.0(4.9)

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Percentage of Students Responding Correctly to Mathematics Trend Items

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Find area of irregular shape	1990	22.2(1.8)	25.8(2.2)	18.6(2.0)	24.3(2.1)	11.2(3.5)	13.6(3.7)
	1986	19.5(1.2)	24.7(2.0)	14.6(1.5)	22.5(1.3)	5.3(1.9)	6.2(2.6)
	1982	13.9(1.2)	17.2(1.7)	10.8(1.2)	16.1(1.3)	3.1(0.9)	3.2(1.8)
	1978	16.1(1.3)	22.1(1.8)	10.7(1.3)	17.8(1.4)	3.3(1.1)	6.8(2.9)
Relate square to circle	1990	63.6(1.7)	64.6(1.9)	62.6(2.1)	66.2(1.9)	56.3(4.5)	52.1(6.8)
	1986	54.6(1.6)	59.5(2.3)	50.2(1.8)	57.1(1.9)	44.0(3.2)	42.4(4.6)
	1982	57.7(1.5)	61.9(2.5)	53.6(2.2)	61.6(1.6)	35.1(3.5)	46.4(3.9)
Use properties of triangles	1990	68.3(1.8)	68.1(2.0)	68.4(2.0)	70.9(2.1)	58.2(4.5)	55.6(3.9)
	1986	62.7(1.9)	64.6(2.1)	61.0(2.2)	66.5(1.9)	48.7(4.2)	43.0(4.2)
	1982	58.2(1.5)	59.1(1.8)	57.3(1.6)	61.9(1.8)	40.4(3.4)	32.8(4.1)
	1978	60.3(1.6)	63.0(1.9)	57.8(2.1)	63.4(1.8)	41.1(3.6)	50.5(5.6)
Use properties of triangles	1990	57.4(1.6)	57.2(2.1)	57.5(1.7)	58.5(1.8)	51.9(3.2)	49.4(***)
	1986	57.2(1.5)	57.6(1.5)	56.8(2.3)	61.1(1.7)	42.0(3.4)	46.3(4.3)
	1982	54.3(1.2)	54.3(1.7)	54.3(1.7)	56.6(1.3)	44.0(3.2)	38.1(5.1)
	1978	53.2(1.5)	55.3(1.9)	51.3(1.9)	55.6(1.6)	42.2(3.2)	38.4(5.1)
Use properties of triangles	1990	49.6(2.0)	52.4(2.7)	46.7(2.3)	51.4(1.9)	43.9(6.2)	35.4(5.3)
	1986	45.7(1.7)	47.3(2.3)	44.3(1.8)	49.3(2.0)	30.1(3.9)	34.3(5.1)
	1982	44.9(1.8)	46.1(2.2)	43.8(1.8)	48.1(2.2)	26.1(2.7)	32.8(5.9)
	1978	47.4(1.4)	53.4(1.9)	41.9(1.8)	49.9(1.6)	37.8(3.9)	25.0(3.6)
Use properties of triangles	1990	54.3(1.5)	56.2(1.6)	52.3(2.1)	56.4(1.6)	43.7(3.4)	47.7(6.0)
	1986	50.2(1.5)	53.6(1.6)	47.0(2.1)	53.0(1.6)	38.0(3.0)	36.3(6.6)
	1982	50.9(1.6)	52.2(2.0)	49.6(1.9)	53.7(1.9)	33.0(2.5)	43.3(6.0)
	1978	54.7(1.8)	60.1(1.9)	49.8(2.2)	57.4(1.9)	42.3(3.8)	33.8(5.9)
Identify a sphere	1990	80.0(1.4)	82.4(1.8)	77.6(1.5)	83.7(1.1)	65.9(5.1)	67.8(7.6)
	1986	77.2(1.3)	79.4(2.1)	75.1(1.7)	81.8(1.4)	62.2(3.9)	54.9(4.8)
	1982	76.1(1.5)	77.5(1.7)	74.8(1.8)	81.6(1.4)	49.4(4.7)	55.6(4.6)
	1978	79.1(1.3)	81.0(1.5)	77.5(1.6)	83.4(1.2)	51.6(3.1)	65.2(4.2)
Apply angle addition property	1990	59.8(1.8)	60.5(1.9)	59.0(2.2)	61.9(2.2)	51.5(3.1)	51.8(5.5)
	1986	60.2(1.6)	62.3(2.4)	58.3(2.1)	64.0(1.6)	41.6(5.4)	51.8(5.3)
	1982	63.7(1.6)	65.3(1.9)	62.3(2.1)	67.4(1.5)	48.0(3.4)	43.9(4.3)
	1978	63.4(1.4)	63.6(2.2)	63.2(1.5)	66.3(1.5)	44.9(2.8)	55.6(6.8)
Identify parallel lines	1990	97.1(0.5)	96.8(0.8)	97.5(0.6)	98.0(0.4)	95.7(1.0)	91.1(5.2)
	1986	95.8(0.6)	96.2(0.7)	95.4(0.8)	97.9(0.4)	87.5(2.4)	90.9(3.2)
	1982	96.3(0.6)	97.0(0.7)	95.6(0.9)	97.8(0.5)	89.5(2.2)	87.3(2.3)
	1978	94.8(0.7)	94.3(1.0)	95.2(0.7)	96.8(0.6)	83.3(2.3)	85.0(7.8)
Identify perpendicular lines	1990	65.8(1.8)	64.1(2.4)	67.6(1.8)	68.9(2.2)	55.7(4.5)	46.9(4.2)
	1986	65.4(1.7)	65.8(2.0)	65.0(2.2)	70.1(1.7)	46.8(3.9)	48.7(5.1)
	1982	70.3(1.7)	73.8(2.3)	67.2(2.0)	74.6(1.7)	49.1(3.9)	53.1(4.7)
	1978	70.1(1.5)	72.8(1.8)	67.7(1.9)	74.6(1.3)	46.0(4.1)	42.8(5.4)
Apply concept of inequality	1990	25.5(1.3)	30.0(1.9)	21.0(1.3)	24.7(1.6)	25.1(2.4)	28.9(5.4)
	1986	25.5(1.2)	28.2(2.2)	23.1(1.3)	26.1(1.4)	19.4(2.3)	27.8(4.2)
	1982	35.4(1.2)	37.0(2.0)	34.0(1.3)	36.9(1.5)	25.7(3.0)	35.9(4.5)
	1978	34.3(1.4)	38.9(2.2)	30.2(1.3)	36.0(1.6)	23.3(3.4)	24.8(4.9)
Define equivalent equations	1990	55.1(1.6)	55.0(1.8)	55.1(2.3)	58.6(1.5)	40.2(3.8)	50.6(4.5)
	1986	56.5(2.8)	56.0(3.4)	57.0(3.2)	59.4(3.1)	44.0(4.4)	45.8(4.4)
	1982	52.5(2.2)	53.7(2.6)	51.3(2.6)	55.8(2.5)	38.4(3.7)	31.5(5.0)
	1978	60.2(1.4)	60.7(1.9)	59.7(2.1)	63.2(1.4)	42.9(4.7)	46.1(4.8)

NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 17

Percentage of Students Responding Correctly to Mathematics Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Identify valid identity	1990	33.9(1.5)	33.9(1.8)	33.9(1.8)	35.2(1.5)	26.8(3.4)	29.2(9.4)
	1986	32.0(1.4)	33.4(1.9)	30.7(1.7)	33.0(1.7)	27.5(2.6)	26.7(3.2)
	1982	38.6(1.9)	39.5(2.4)	37.8(2.0)	40.2(2.0)	31.0(3.7)	33.1(4.2)
	1978	37.9(1.4)	38.1(2.1)	37.7(1.9)	39.4(1.6)	28.4(2.9)	28.9(6.8)
Add monomials	1990	78.3(1.5)	75.0(1.9)	81.6(1.6)	81.1(1.7)	68.0(5.3)	61.4(5.6)
	1986	73.3(1.7)	71.6(2.0)	74.9(1.9)	77.4(1.8)	55.8(3.9)	58.5(5.3)
	1982	64.4(1.3)	63.0(1.8)	65.7(1.7)	67.7(1.5)	46.4(3.4)	45.7(3.2)
	1978	63.3(1.8)	61.8(2.3)	64.7(2.0)	68.1(1.7)	36.4(3.1)	38.4(3.7)
Simplify square root	1990	15.2(1.1)	17.9(1.4)	12.4(1.3)	16.1(1.2)	11.0(2.7)	8.7(4.4)
	1986	15.0(1.3)	18.2(1.8)	12.1(1.4)	16.6(1.5)	4.8(1.8)	7.1(3.0)
	1982	11.8(1.3)	13.2(1.8)	10.5(1.3)	12.8(1.4)	3.9(1.3)	11.1(3.8)
	1978	11.3(1.2)	14.4(1.5)	8.4(1.3)	12.2(1.2)	5.2(1.9)	4.8(2.8)
Evaluate function for value	1990	50.4(1.5)	47.9(2.0)	52.5(1.9)	53.2(1.5)	44.9(5.4)	34.6(4.6)
	1986	53.4(1.8)	52.5(2.6)	54.3(2.4)	56.4(1.8)	38.7(5.2)	43.1(4.0)
	1982	48.8(1.8)	49.6(1.9)	48.1(2.3)	50.8(1.7)	38.7(4.5)	34.1(7.3)
	1978	43.7(1.7)	44.3(2.7)	43.1(2.4)	46.4(1.9)	27.8(3.3)	29.5(3.7)
Evaluate algebraic expression	1990	90.8(0.8)	90.1(1.2)	91.6(0.8)	92.3(0.7)	85.6(2.9)	83.7(6.3)
	1986	89.3(0.9)	88.7(1.3)	90.0(0.9)	92.3(1.0)	78.2(3.0)	81.0(3.4)
	1982	89.1(0.9)	88.8(1.3)	89.5(1.2)	91.6(0.9)	75.3(2.4)	82.3(3.8)
	1978	89.9(0.9)	90.2(1.2)	89.6(1.3)	92.8(0.8)	73.9(3.4)	77.0(3.7)
Identify number line property	1990	71.7(1.4)	73.2(2.0)	70.3(1.6)	76.5(1.3)	52.7(5.0)	58.1(4.1)
	1986	69.0(1.7)	70.3(2.1)	67.7(2.2)	74.4(1.8)	44.9(3.3)	51.1(3.8)
	1982	61.4(1.6)	65.5(2.4)	57.3(2.5)	66.1(1.6)	37.6(2.4)	39.4(4.7)
	1978	70.9(1.6)	74.9(2.1)	67.0(1.8)	75.4(1.7)	46.9(3.6)	54.6(5.3)
Identify linear inequality	1990	35.1(1.7)	37.4(2.0)	33.1(2.0)	36.6(1.8)	30.3(4.2)	29.4(3.2)
	1986	35.4(1.9)	38.1(2.5)	32.7(2.0)	35.5(2.2)	33.8(3.5)	34.8(5.5)
	1982	32.0(1.7)	31.9(2.1)	32.0(1.7)	33.0(2.1)	28.0(3.0)	25.5(4.7)
	1978	33.6(1.0)	36.3(1.4)	30.9(1.4)	34.9(1.2)	27.7(3.4)	22.3(3.8)
Find percent greater than 100	1990	72.8(1.6)	76.0(1.9)	69.7(2.1)	77.4(1.8)	55.7(3.8)	55.2(8.0)
	1986	70.6(1.4)	75.2(1.7)	66.5(1.9)	74.4(1.6)	57.4(3.6)	56.1(5.1)
	1982	65.0(1.6)	67.4(2.1)	62.6(1.8)	68.0(1.7)	49.5(3.5)	54.4(4.8)
	1978	58.2(1.5)	66.7(1.7)	50.6(2.1)	60.0(1.6)	41.7(2.8)	60.4(9.1)
Understand concept of percent	1990	70.5(1.8)	75.1(2.2)	65.9(1.9)	75.8(1.7)	54.4(6.8)	43.1(8.0)
	1986	69.6(1.4)	74.1(1.9)	65.5(1.9)	75.8(1.2)	46.3(4.3)	47.7(7.6)
	1982	71.4(1.8)	76.2(1.8)	66.6(2.3)	76.3(1.5)	46.8(5.0)	51.5(6.1)
	1978	67.9(1.5)	75.2(1.6)	61.4(2.1)	72.0(1.5)	45.3(3.3)	43.0(6.0)
Convert decimal to percent	1990	61.3(1.8)	62.0(2.7)	60.6(1.9)	64.1(1.7)	49.1(5.2)	45.7(5.9)
	1986	54.1(1.6)	55.3(2.4)	53.0(1.6)	58.4(1.8)	34.3(2.4)	37.5(4.8)
	1982	44.9(1.9)	49.2(2.8)	40.6(2.0)	48.5(2.1)	25.7(3.5)	29.9(5.0)
	1978	45.0(1.6)	45.7(1.9)	44.3(2.0)	47.4(1.6)	27.6(3.2)	40.9(7.0)
Convert percent to decimal	1990	94.9(0.6)	94.3(0.9)	95.5(0.7)	95.6(0.5)	90.1(2.1)	96.2(1.9)
	1986	92.6(0.6)	91.1(1.1)	94.0(0.7)	94.0(0.5)	87.1(2.6)	88.2(2.8)
	1982	81.6(0.9)	81.7(1.6)	81.6(1.3)	83.4(1.1)	74.7(2.3)	71.9(5.5)
	1978	78.2(1.1)	77.8(1.6)	78.5(1.2)	79.0(1.1)	74.0(3.0)	72.1(6.9)
Use concept of percent	1990	62.4(1.8)	66.0(2.2)	58.8(1.9)	69.5(1.9)	37.2(5.3)	41.0(6.2)
	1986	61.1(1.7)	64.8(2.1)	57.7(2.3)	67.4(1.8)	34.2(4.2)	42.3(7.1)
	1982	70.9(1.7)	74.5(1.5)	67.4(2.7)	76.8(1.9)	45.2(3.1)	45.1(1.8)
	1978	69.8(1.3)	74.4(1.7)	65.4(1.7)	74.9(1.1)	38.6(4.4)	53.0(5.2)

NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 17

Percentage of Students Responding Correctly to Mathematics Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Find percent of number	1990	69.2(1.6)	74.1(1.8)	64.2(2.2)	72.8(1.7)	58.1(5.1)	46.4(4.8)
	1986	68.4(1.4)	71.9(1.6)	65.2(1.9)	72.9(1.3)	49.5(3.5)	54.9(5.3)
	1982	69.6(1.4)	75.1(1.6)	64.2(2.0)	73.5(1.5)	49.4(2.7)	49.1(4.6)
	1978	69.3(1.4)	76.0(1.7)	63.1(1.8)	73.6(1.4)	45.8(4.0)	50.8(5.7)
Solve percent problem	1990	68.2(1.5)	73.0(1.7)	64.0(2.3)	73.7(1.4)	52.6(4.5)	51.1(3.9)
	1986	68.3(1.5)	70.9(2.1)	65.7(1.8)	73.4(1.4)	43.0(4.6)	60.9(5.5)
	1982	72.4(1.9)	72.6(2.9)	72.2(1.9)	75.5(2.2)	57.6(3.3)	57.5(2.8)
	1978	67.0(1.5)	69.3(2.0)	64.9(1.8)	70.4(1.6)	47.2(3.1)	54.2(5.9)
Add integers	1990	87.0(1.2)	86.3(1.6)	87.6(1.2)	89.2(1.4)	77.7(3.4)	77.9(5.0)
	1986	82.9(1.2)	83.8(1.4)	82.2(1.9)	85.8(1.0)	66.3(4.3)	70.2(5.1)
	1982	76.8(1.5)	79.1(1.6)	74.5(1.9)	82.2(1.3)	49.6(5.2)	59.4(5.1)
	1978	79.8(1.5)	79.1(1.7)	80.3(1.8)	84.7(1.4)	49.7(3.1)	60.8(5.0)
Add integers	1990	89.4(1.2)	88.9(1.6)	89.9(1.2)	92.6(0.9)	80.0(3.4)	70.6(***)
	1986	87.2(1.3)	89.5(1.4)	85.1(1.7)	90.8(1.0)	71.9(4.4)	76.4(4.7)
	1982	84.1(1.3)	84.7(1.5)	83.5(1.8)	89.0(1.3)	60.3(3.9)	61.6(5.1)
	1978	84.7(1.3)	85.8(1.5)	83.6(1.6)	88.5(1.1)	60.5(4.1)	74.4(4.6)
Estimate square root	1990	48.3(2.0)	51.4(2.4)	45.2(2.3)	52.7(2.1)	32.7(6.0)	26.4(4.8)
	1986	46.2(1.5)	50.1(2.1)	42.7(2.1)	50.7(1.7)	27.3(3.6)	29.7(3.2)
	1982	42.5(2.0)	46.3(2.8)	38.7(2.5)	47.3(2.2)	17.9(2.3)	27.3(3.7)
	1978	42.6(1.4)	47.6(2.0)	38.1(1.8)	47.3(1.5)	16.6(2.6)	15.0(4.0)
Estimate square root	1990	58.1(2.1)	60.2(2.6)	56.0(2.0)	62.6(2.2)	41.6(6.9)	39.4(5.0)
	1986	53.1(1.8)	57.9(2.7)	48.7(2.1)	58.1(1.8)	32.1(4.4)	37.5(4.7)
	1982	56.3(1.8)	59.9(2.2)	52.9(2.6)	60.6(1.7)	31.0(3.3)	44.7(4.9)
	1978	58.1(1.9)	62.8(2.0)	53.9(2.5)	62.5(2.1)	33.2(3.8)	33.4(7.2)
Solve number sentence	1990	72.4(1.3)	71.4(1.9)	73.5(1.4)	75.5(1.4)	59.6(2.8)	67.9(4.1)
	1986	69.9(1.7)	71.5(2.0)	68.5(2.1)	74.2(1.8)	52.3(4.6)	60.8(4.8)
	1982	60.6(1.4)	63.9(1.9)	57.6(1.7)	65.7(1.4)	35.9(3.9)	39.7(3.8)
	1978	68.2(1.5)	70.0(1.9)	66.4(2.1)	73.7(1.4)	37.5(3.3)	42.4(5.8)
Estimate weight	1990	63.6(1.7)	64.5(2.1)	62.7(2.1)	65.2(1.9)	57.9(4.1)	57.2(8.2)
	1986	62.9(1.3)	65.6(2.0)	60.5(1.6)	65.6(1.3)	52.1(2.9)	55.6(5.3)
	1982	45.9(1.7)	48.4(2.5)	43.5(1.6)	48.5(2.1)	30.6(3.4)	41.8(5.1)
Estimate total weight	1990	53.3(1.8)	56.3(2.4)	50.3(2.0)	55.8(2.1)	43.7(4.1)	45.3(5.1)
	1986	50.0(1.4)	51.6(2.1)	48.6(1.9)	53.7(1.6)	34.6(3.3)	38.1(3.5)
	1982	41.0(1.5)	44.9(1.8)	37.4(2.0)	43.0(1.5)	27.4(2.8)	40.7(2.6)
Estimate cost of pencils	1990	91.1(0.7)	92.1(0.9)	90.1(0.9)	91.9(0.9)	89.2(1.8)	84.0(3.6)
	1986	89.4(0.7)	89.8(1.2)	89.0(1.1)	91.8(0.7)	77.9(2.7)	85.5(3.8)
	1982	78.6(1.0)	81.6(1.3)	75.7(1.7)	80.8(1.0)	69.0(3.0)	65.9(5.8)
Estimate cost using percent	1990	47.0(1.2)	51.8(1.9)	42.2(1.5)	48.1(1.4)	43.1(3.3)	34.2(4.2)
	1986	44.1(1.4)	46.5(1.8)	41.9(1.8)	46.2(1.5)	37.0(3.2)	36.8(3.0)
	1982	44.0(1.6)	48.1(1.9)	40.3(1.9)	45.1(1.6)	35.7(3.6)	44.6(3.3)
Estimate difference in length	1990	80.7(1.2)	81.3(1.8)	80.0(1.2)	82.9(1.1)	69.8(4.6)	74.6(8.1)
	1986	82.5(0.9)	82.7(1.3)	82.2(1.1)	86.9(0.8)	65.0(2.1)	66.9(5.5)
	1982	72.6(1.4)	73.9(2.0)	71.3(1.6)	76.2(1.6)	57.0(4.2)	57.4(4.1)
Use deductive reasoning	1990	80.2(1.4)	79.2(1.7)	81.3(1.8)	83.6(1.3)	70.6(4.1)	66.0(6.9)
	1986	78.7(0.9)	77.8(1.3)	79.5(1.4)	81.4(1.1)	69.8(4.1)	65.2(3.5)
	1982	81.7(1.0)	80.4(1.8)	82.9(1.2)	83.1(1.1)	74.6(3.2)	75.6(4.0)
	1978	84.1(0.9)	82.7(1.6)	85.4(1.2)	86.3(0.9)	70.8(2.9)	75.2(5.6)

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NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 17

Percentage of Students Responding Correctly to Mathematics Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Determine age relationship	1990	86.8(1.0)	86.9(1.4)	86.8(1.0)	89.3(1.0)	79.2(2.6)	72.1(5.4)
	1986	86.3(1.1)	87.6(1.2)	85.1(1.5)	89.4(1.0)	71.8(3.3)	82.3(4.2)
	1982	79.7(1.3)	80.8(1.5)	78.7(1.6)	82.4(1.2)	63.6(3.0)	73.9(4.3)
	1978	82.3(1.2)	81.4(1.6)	83.1(1.2)	85.8(1.1)	60.1(3.7)	72.3(4.2)
Identify valid conclusion	1990	81.8(1.0)	79.1(1.6)	84.5(1.3)	83.9(1.0)	78.2(2.9)	70.3(4.5)
	1986	78.3(1.4)	75.8(2.0)	80.7(1.6)	80.9(1.3)	70.4(4.4)	67.0(5.7)
	1982	69.3(1.2)	66.5(1.6)	71.9(1.4)	71.0(1.3)	63.9(4.5)	57.5(3.9)
	1978	72.0(1.4)	70.3(1.7)	73.5(1.9)	72.6(1.4)	69.8(4.2)	62.5(5.4)
Identify valid conclusion	1990	38.7(1.4)	40.8(1.9)	36.6(1.7)	41.1(1.6)	26.5(2.3)	36.7(3.4)
	1986	41.9(1.3)	44.8(2.1)	39.3(2.1)	44.1(1.5)	31.6(2.9)	36.8(3.8)
	1982	56.6(1.2)	61.3(1.8)	52.0(1.8)	59.4(1.1)	41.7(3.9)	49.6(3.8)
	1978	58.9(1.2)	63.4(1.6)	54.6(1.9)	60.9(1.3)	48.4(3.9)	53.9(5.0)
Identify false statement	1990	51.2(1.5)	51.5(2.1)	50.9(1.8)	55.2(1.5)	39.1(5.4)	32.9(5.5)
	1986	51.0(1.7)	53.1(2.2)	49.0(1.9)	55.1(1.8)	35.7(4.1)	37.0(5.1)
	1982	50.4(1.3)	51.2(1.5)	49.7(2.0)	54.8(1.4)	29.5(3.1)	33.2(3.8)
	1978	52.3(1.7)	53.9(2.1)	50.7(2.4)	56.9(1.6)	29.8(3.2)	25.4(5.5)
Compute using data in table	1990	32.2(1.7)	34.8(2.5)	29.5(1.8)	36.6(1.7)	16.7(2.9)	14.1(5.8)
	1986	34.6(1.4)	34.6(2.3)	34.5(1.7)	39.7(1.6)	17.2(2.7)	15.6(4.9)
	1982	43.5(1.6)	45.5(1.8)	41.6(2.2)	48.2(1.7)	21.6(4.6)	23.8(3.9)
	1978	50.9(1.4)	49.3(2.0)	52.6(1.8)	55.7(1.6)	28.5(4.1)	19.8(5.3)
Interpret data in table	1990	70.2(1.5)	71.9(2.0)	68.5(1.5)	75.3(1.4)	49.3(4.7)	56.0(***)
	1986	65.4(1.5)	69.0(2.2)	62.2(1.9)	71.7(1.9)	38.4(2.7)	53.9(3.8)
	1982	66.4(1.4)	70.2(1.6)	62.6(2.0)	72.5(1.2)	33.6(3.7)	46.5(4.5)
	1978	66.0(1.3)	69.5(1.6)	62.9(2.0)	71.4(1.2)	34.2(4.1)	45.4(6.5)
Read line graph	1990	89.3(0.8)	90.4(1.1)	88.1(1.1)	90.8(0.8)	83.7(2.7)	86.6(3.2)
	1986	86.8(1.0)	88.3(1.5)	85.5(1.1)	91.0(0.9)	69.9(3.4)	75.4(3.8)
	1982	86.7(1.0)	89.1(1.3)	84.5(1.2)	90.2(0.9)	71.1(2.4)	70.8(4.4)
	1978	80.4(1.2)	82.7(1.4)	78.1(1.7)	83.2(1.5)	62.9(3.1)	67.8(7.0)
Interpret line graph	1990	79.2(1.0)	79.9(1.7)	78.6(1.2)	83.3(1.0)	65.1(3.3)	66.7(9.2)
	1986	76.3(1.3)	77.1(2.0)	75.6(1.7)	80.3(1.4)	61.1(3.5)	64.7(5.1)
	1982	77.3(1.5)	78.6(1.9)	76.0(1.7)	80.9(1.3)	62.5(3.4)	56.3(5.4)
	1978	69.9(1.1)	74.3(1.3)	65.4(1.9)	72.1(1.2)	52.4(2.2)	69.4(4.1)
Solve multi-step problem	1990	26.3(1.4)	31.5(2.0)	21.0(1.5)	30.6(1.4)	10.1(3.2)	8.5(4.2)
	1986	26.9(1.5)	32.3(2.1)	21.9(1.6)	31.3(1.7)	8.8(2.6)	13.3(3.1)
	1982	27.1(1.5)	30.9(2.0)	23.4(2.2)	31.4(1.5)	6.4(1.9)	13.0(4.2)
	1978	29.6(1.2)	36.7(1.9)	22.9(1.3)	33.4(1.3)	7.2(2.1)	16.3(4.9)
Solve multi-step problem	1990	31.7(1.5)	37.1(1.8)	26.9(1.9)	38.8(1.4)	7.6(1.3)	14.7(2.5)
	1986	33.1(1.7)	40.7(2.1)	25.2(2.2)	37.5(1.6)	12.8(2.4)	17.4(3.3)
	1982	25.8(1.1)	30.4(2.0)	21.5(1.6)	29.3(1.3)	8.6(1.8)	12.2(1.8)
	1978	30.2(1.5)	39.2(2.3)	21.6(1.4)	34.2(1.8)	7.5(1.6)	11.7(4.3)
Solve money problem*	1990	68.3(1.5)	66.7(2.2)	69.8(1.8)	74.4(1.2)	48.2(5.0)	51.6(6.9)
	1986	67.7(1.6)	67.7(2.5)	67.7(1.5)	73.0(1.4)	42.2(4.1)	58.9(5.1)
	1982	67.0(1.0)	65.0(1.6)	68.8(1.4)	71.0(1.1)	48.4(2.7)	48.9(6.1)
	1978	68.5(1.5)	69.4(2.1)	67.6(1.8)	71.8(1.4)	44.1(3.9)	57.1(5.4)
Identify algebraic identity	1990	64.8(1.9)	64.1(2.5)	65.4(1.8)	68.6(1.8)	50.7(5.3)	48.8(***)
	1986	63.8(1.5)	63.7(1.7)	63.9(2.4)	68.5(1.3)	44.1(4.1)	42.9(5.1)
	1982	64.2(1.9)	63.2(2.4)	65.1(2.1)	69.8(1.6)	42.4(3.5)	26.9(4.9)
	1978	69.0(1.8)	69.6(1.9)	68.5(2.3)	73.5(1.8)	43.4(2.4)	46.3(5.7)

NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 17

Percentage of Students Responding Correctly to Mathematics Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Relate meter to yard	1990	67.2(1.7)	75.2(1.7)	60.1(2.3)	74.3(1.5)	42.3(4.4)	53.6(3.9)
	1986	69.3(1.4)	77.4(1.5)	61.1(2.0)	73.3(1.4)	45.5(3.6)	70.9(7.9)
	1982	71.6(1.4)	79.1(1.9)	64.3(1.6)	76.2(1.4)	47.4(3.1)	57.2(4.2)
	1978	71.4(1.6)	78.7(1.8)	64.8(2.3)	75.8(1.3)	43.9(2.9)	58.3(7.3)
Estimate height of door	1990	84.3(1.1)	89.2(1.5)	79.2(1.4)	88.0(1.1)	75.0(2.8)	66.7(7.5)
	1986	82.3(1.4)	89.8(1.2)	75.4(2.0)	85.0(1.6)	71.9(3.6)	71.7(3.9)
	1982	82.5(1.0)	89.6(1.3)	75.9(1.6)	85.9(0.9)	62.8(2.9)	78.7(3.3)
	1978	86.4(1.0)	92.0(1.1)	81.5(1.4)	89.4(1.0)	69.3(2.9)	78.1(6.0)
Solve multi-step problem	1990	30.9(1.5)	33.6(1.8)	28.5(1.8)	36.8(1.5)	13.7(2.6)	15.2(2.8)
	1986	26.4(1.8)	27.3(2.2)	25.5(2.3)	28.7(2.2)	13.1(2.8)	17.7(3.6)
	1982	25.1(1.5)	26.6(1.5)	23.7(2.1)	28.2(1.6)	9.9(2.2)	13.5(3.9)
	1978	29.0(1.5)	30.1(1.7)	28.0(1.7)	32.4(1.6)	7.2(1.9)	21.1(4.5)
Estimate circumference	1990	23.7(1.6)	27.8(1.7)	19.5(1.8)	26.1(1.8)	13.7(3.4)	14.5(4.7)
	1986	19.9(1.1)	23.0(1.5)	17.0(1.8)	22.9(1.4)	6.7(1.5)	14.0(4.1)
	1982	16.9(1.3)	20.4(2.1)	13.4(1.5)	19.3(1.5)	5.6(1.5)	5.6(3.6)
	1978	22.5(1.4)	27.1(2.2)	17.9(1.5)	24.7(1.5)	10.5(2.7)	12.0(4.1)
Find area given perimeter	1990	43.1(2.2)	44.5(2.8)	41.7(2.4)	46.5(2.3)	29.3(6.0)	27.1(5.2)
	1986	38.7(1.7)	39.4(2.2)	38.0(2.1)	42.0(1.8)	21.2(4.5)	23.8(3.4)
	1982	34.0(2.1)	35.1(2.7)	32.0(2.3)	37.2(2.4)	17.7(2.4)	19.6(3.2)
	1978	32.3(1.7)	37.8(2.6)	27.3(2.0)	34.3(1.8)	19.6(3.1)	22.4(5.0)
Find area of rectangle	1990	66.4(1.7)	68.9(2.2)	63.9(1.8)	69.1(1.7)	55.7(3.7)	54.2(***)
	1986	62.7(1.7)	63.4(2.1)	62.0(2.0)	65.7(2.0)	49.8(4.8)	50.6(4.0)
	1982	73.9(1.5)	75.3(2.1)	72.7(1.6)	76.3(1.7)	60.5(4.4)	68.3(4.0)
	1978	73.4(1.8)	73.8(2.6)	73.0(1.7)	78.3(1.7)	43.5(3.5)	65.4(6.4)
Apply vertical angles	1990	89.6(0.9)	89.6(1.3)	89.6(1.1)	92.0(0.7)	79.7(3.5)	82.6(4.7)
	1986	88.0(1.2)	89.1(1.6)	87.0(1.4)	90.4(1.1)	78.0(3.1)	76.6(5.9)
	1982	85.1(1.1)	86.1(1.3)	84.3(1.9)	87.7(1.3)	74.9(2.1)	68.5(4.5)
	1978	81.5(1.2)	80.9(1.5)	82.0(1.5)	85.3(1.1)	59.9(4.8)	60.0(4.8)
Apply supplementary angles	1990	55.2(1.9)	58.6(2.6)	51.7(1.9)	60.0(2.1)	37.2(5.9)	34.9(3.6)
	1986	48.0(1.9)	50.8(2.2)	45.4(2.2)	53.9(2.0)	24.4(3.0)	25.7(4.4)
	1982	40.0(2.6)	42.6(2.8)	37.6(2.8)	45.5(2.7)	13.3(2.3)	13.2(3.6)
	1978	39.7(1.6)	42.7(2.1)	36.6(2.4)	43.7(1.6)	15.5(4.2)	15.1(3.7)
Identify sign of divisor	1990	60.3(1.5)	60.5(1.7)	60.1(1.9)	64.8(1.4)	45.0(5.5)	51.6(4.2)
	1986	58.6(2.2)	61.6(3.1)	55.6(2.0)	62.2(2.4)	38.6(4.3)	50.6(7.2)
	1982	59.4(1.9)	61.2(2.6)	57.8(2.2)	61.5(2.0)	44.7(4.4)	58.6(5.9)
	1978	56.5(1.5)	57.9(2.3)	55.3(1.6)	58.7(1.5)	45.9(3.6)	43.0(7.2)
Add whole numbers	1990	97.9(0.3)	97.5(0.4)	98.2(0.4)	98.3(0.3)	96.7(1.4)	96.9(1.5)
	1986	98.6(0.5)	98.7(0.5)	98.4(0.6)	99.3(0.2)	95.1(3.6)	96.3(1.8)
	1982	98.1(0.4)	97.8(0.5)	98.3(0.4)	97.9(0.4)	99.2(0.6)	98.3(1.3)
Add whole numbers	1990	98.4(0.3)	97.7(0.6)	99.1(0.3)	98.6(0.3)	97.9(1.4)	99.4(0.6)
	1986	98.4(0.4)	98.1(0.5)	98.6(0.6)	98.7(0.3)	96.3(2.2)	98.7(1.4)
	1982	97.7(0.4)	96.6(0.7)	98.8(0.4)	97.8(0.5)	97.6(0.9)	97.1(1.4)
Add whole numbers	1990	95.4(0.5)	94.2(0.9)	96.5(0.5)	96.2(0.5)	95.4(1.1)	90.5(2.4)
	1986	94.7(0.8)	93.6(1.3)	95.9(0.8)	96.0(0.7)	91.6(3.0)	89.0(3.7)
	1982	92.6(0.7)	90.1(1.3)	95.0(0.7)	93.7(0.6)	88.2(2.4)	87.3(3.1)

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NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 17

Percentage of Students Responding Correctly to Mathematics Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Multiply fractions	1990	76.7(1.5)	73.9(1.8)	79.6(1.6)	77.7(1.7)	73.5(2.5)	65.3(9.6)
	1986	75.1(1.2)	72.9(1.5)	77.2(1.7)	78.0(1.3)	66.1(3.0)	57.6(5.7)
	1982	71.6(1.4)	71.3(1.6)	71.8(1.9)	74.8(1.3)	58.2(1.9)	46.8(5.2)
	1978	75.0(1.3)	71.8(1.8)	78.1(1.7)	78.1(1.2)	58.9(4.0)	53.7(5.2)
Multiply fractions	1990	72.6(1.6)	70.7(1.8)	74.5(2.0)	73.5(1.8)	69.3(2.5)	60.9(9.8)
	1986	67.4(1.6)	63.6(1.9)	70.8(2.0)	69.5(1.7)	57.0(4.3)	57.6(5.0)
	1982	59.7(1.8)	60.2(2.0)	59.3(2.4)	63.9(1.7)	40.2(2.8)	33.3(5.1)
	1978	66.9(1.7)	66.3(2.1)	67.4(2.0)	70.9(1.5)	40.8(4.0)	53.5(5.7)
Multiply fractions	1990	78.2(1.3)	76.4(1.4)	80.0(1.6)	79.1(1.3)	76.8(2.2)	63.4(9.3)
	1986	75.4(1.3)	73.4(1.9)	77.2(1.6)	76.7(1.6)	69.9(2.9)	68.5(6.9)
	1982	69.4(1.7)	68.1(1.9)	70.7(2.0)	72.5(1.7)	53.4(2.7)	50.5(4.4)
	1978	75.8(1.4)	73.8(2.0)	77.7(1.8)	78.4(1.2)	60.2(4.5)	60.8(7.1)
Find percent given numbers	1990	72.9(1.6)	79.3(1.8)	66.3(1.9)	77.0(1.8)	58.7(5.3)	54.6(5.9)
	1986	72.5(1.6)	79.9(1.6)	65.6(2.2)	77.7(1.7)	52.9(3.5)	53.2(4.6)
	1982	74.3(1.5)	80.7(2.0)	68.4(2.1)	78.6(1.2)	45.6(3.1)	71.8(4.3)
Find percent of number	1990	68.9(1.2)	71.5(1.8)	66.3(1.6)	71.9(1.4)	57.3(4.5)	55.9(8.3)
	1986	63.9(1.3)	68.4(2.0)	59.8(1.4)	67.6(1.4)	43.6(3.5)	60.2(4.7)
	1982	54.1(1.9)	57.4(2.9)	51.1(2.2)	56.7(2.1)	36.4(2.7)	50.4(4.9)
Find percent greater than 100	1990	63.3(1.8)	67.1(2.4)	59.5(1.9)	67.8(2.1)	46.2(4.6)	45.3(5.8)
	1986	56.3(1.4)	62.2(1.9)	50.8(1.7)	61.0(1.4)	34.0(3.2)	39.8(6.1)
	1982	46.4(2.6)	50.6(2.9)	42.5(2.7)	50.3(3.0)	22.5(2.9)	40.6(3.3)
Find number given percent	1990	37.6(1.3)	40.6(2.0)	34.6(1.7)	40.6(1.6)	21.1(2.1)	33.2(3.5)
	1986	32.0(1.2)	38.4(1.9)	26.0(1.2)	34.4(1.5)	19.7(2.6)	30.0(5.0)
	1982	36.4(2.1)	40.8(2.8)	32.4(2.1)	38.3(2.5)	24.5(2.4)	34.9(4.7)
Find percent given numbers	1990	62.9(1.5)	70.9(1.6)	55.8(1.8)	69.2(1.3)	43.6(3.6)	44.8(3.2)
	1986	63.4(1.7)	71.0(2.1)	55.6(1.9)	69.9(1.5)	35.7(4.1)	47.1(5.7)
	1982	60.3(1.4)	69.1(2.1)	52.2(2.1)	65.1(1.6)	32.5(2.6)	48.7(3.4)
Find percent of number	1990	63.1(1.7)	66.6(2.2)	59.9(2.1)	68.5(1.5)	45.9(4.7)	49.1(4.8)
	1986	63.7(1.9)	68.5(2.6)	58.7(2.1)	67.8(1.9)	43.5(4.3)	57.2(6.7)
	1982	55.5(1.8)	56.0(2.2)	55.1(2.5)	58.4(1.8)	40.1(3.7)	45.7(7.1)
Find percent greater than 100	1990	58.8(1.7)	65.6(1.8)	52.7(2.3)	65.5(1.5)	36.4(4.8)	42.9(6.7)
	1986	56.9(2.2)	62.7(3.0)	51.0(2.2)	61.8(2.1)	33.7(5.5)	44.5(8.5)
	1982	49.8(1.8)	54.8(2.8)	45.2(2.5)	53.4(1.9)	33.2(3.9)	33.1(4.4)
Find percent given numbers	1990	45.4(1.4)	50.2(2.0)	41.2(2.1)	50.2(1.4)	30.2(4.3)	27.6(4.8)
	1986	42.9(1.9)	48.5(3.1)	37.1(2.0)	46.2(2.0)	28.2(3.7)	30.6(4.9)
	1982	34.7(0.9)	40.5(1.4)	29.4(1.6)	36.4(1.1)	23.3(2.1)	29.6(2.4)
Find number given percent	1990	49.4(1.6)	53.0(1.9)	46.2(2.1)	54.5(1.4)	31.6(6.1)	39.8(4.6)
	1986	44.1(1.8)	47.0(2.8)	41.1(1.7)	48.8(1.8)	21.7(2.6)	33.2(6.6)
	1982	29.5(1.7)	32.6(2.2)	26.6(2.2)	32.3(2.0)	16.4(1.9)	15.0(3.5)
Subtract decimals	1990	74.0(1.5)	71.8(1.9)	76.3(1.7)	75.6(1.6)	66.3(2.5)	66.0(9.5)
	1986	72.2(1.1)	69.0(1.6)	75.2(1.6)	74.7(1.4)	61.3(3.7)	64.8(4.3)
	1982	73.8(1.3)	74.3(1.7)	73.3(1.7)	77.6(1.2)	52.9(4.2)	58.4(4.2)
	1978	71.0(1.8)	69.2(1.9)	72.7(2.0)	74.9(1.6)	46.8(3.7)	55.5(6.2)
Subtract decimals	1990	86.9(0.8)	87.8(1.2)	86.1(1.2)	88.0(0.9)	80.7(2.2)	88.2(2.8)
	1986	85.9(1.0)	85.1(1.5)	86.6(1.5)	88.1(1.2)	76.1(3.1)	79.4(3.8)
	1982	84.7(1.1)	84.6(1.5)	84.8(1.3)	86.6(1.3)	76.0(3.0)	75.6(3.1)
	1978	86.3(1.0)	86.5(1.4)	86.1(1.6)	87.4(1.1)	77.4(2.5)	89.6(6.9)

NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 17

Percentage of Students Responding Correctly to Mathematics Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Divide decimals	1990	78.6(1.5)	75.9(1.9)	81.0(1.6)	83.8(1.0)	61.1(4.8)	66.6(4.6)
	1986	77.6(1.2)	76.0(1.8)	79.2(1.6)	84.5(1.0)	48.4(5.2)	55.5(5.5)
	1982	65.1(2.1)	62.4(2.9)	67.7(1.9)	70.2(2.5)	41.8(3.8)	41.6(2.5)
	1978	77.9(1.5)	77.2(1.7)	78.7(2.1)	81.8(1.4)	50.8(4.1)	71.1(6.0)
Add decimals	1990	89.8(1.0)	87.3(1.5)	92.1(1.0)	93.2(0.7)	79.2(3.0)	81.5(3.8)
	1986	88.4(1.3)	85.2(2.2)	91.7(0.9)	92.2(1.1)	69.0(4.4)	84.6(2.7)
	1982	86.0(1.0)	82.5(1.5)	89.2(1.1)	89.0(1.3)	72.1(3.8)	71.9(4.4)
	1978	88.8(1.1)	87.6(1.5)	90.1(1.3)	91.9(0.8)	68.0(4.1)	82.6(4.6)
Divide decimals	1990	77.7(1.3)	74.6(1.6)	80.4(1.6)	82.2(1.1)	62.7(3.3)	67.4(3.7)
	1986	74.9(2.1)	71.3(3.2)	78.6(1.5)	80.4(2.2)	47.1(4.9)	67.9(2.8)
	1982	70.7(1.4)	63.6(1.6)	77.2(1.9)	74.7(1.6)	53.9(5.6)	49.3(4.5)
	1978	80.1(1.3)	77.7(1.9)	82.5(1.6)	83.5(1.3)	56.6(3.7)	76.0(5.0)
Subtract decimals	1990	76.5(1.3)	73.8(1.8)	78.9(1.5)	80.1(1.4)	68.2(3.9)	63.1(4.1)
	1986	74.7(1.9)	71.9(2.6)	77.5(1.9)	78.9(2.0)	55.4(5.6)	69.1(4.0)
	1982	57.5(2.4)	48.6(2.7)	65.7(2.3)	62.1(2.9)	38.5(3.1)	30.3(4.4)
	1978	70.9(1.6)	67.4(2.1)	74.2(2.0)	75.9(1.6)	41.1(3.9)	53.8(9.0)
Divide decimals	1990	66.3(1.6)	63.6(1.8)	68.8(1.8)	71.1(1.6)	54.3(5.1)	51.3(4.7)
	1986	64.7(2.3)	61.2(3.2)	68.4(2.3)	69.3(2.4)	42.6(4.8)	59.3(5.5)
	1982	44.9(1.5)	36.7(2.0)	52.5(2.0)	48.4(1.8)	28.4(3.7)	27.4(5.1)
	1978	61.4(1.7)	57.4(2.4)	65.3(2.1)	65.8(1.6)	35.8(3.7)	51.9(4.6)
Estimate total cost	1990	37.4(1.3)	42.1(1.6)	32.6(1.9)	40.9(1.5)	22.5(2.2)	30.6(4.6)
	1986	35.5(1.5)	41.6(2.0)	29.9(1.7)	36.7(1.6)	28.0(3.5)	34.8(5.1)
	1982	29.6(1.5)	34.1(2.1)	25.5(1.6)	30.9(1.7)	21.1(3.1)	26.3(3.6)
Multiply equation by constant	1990	18.4(1.2)	22.1(1.8)	14.7(1.6)	18.7(1.2)	15.8(3.3)	9.7(3.0)
	1986	17.3(1.2)	19.3(1.6)	15.5(1.4)	18.3(1.4)	11.3(2.4)	14.7(3.5)
	1982	21.8(1.7)	23.9(2.2)	19.9(1.7)	22.6(2.1)	15.8(2.8)	21.7(3.3)
	1978	20.1(1.1)	25.0(1.7)	15.2(1.3)	22.4(1.2)	6.5(1.8)	7.3(2.1)
Solve equation (square root)	1990	53.3(1.8)	53.7(2.3)	52.9(2.1)	60.4(1.6)	31.5(4.7)	31.6(4.3)
	1986	51.2(1.8)	53.2(2.5)	49.1(2.3)	57.1(1.8)	24.0(4.3)	33.3(4.6)
	1982	45.7(2.6)	45.7(4.0)	45.8(2.1)	49.7(3.3)	27.1(3.4)	26.9(6.1)
	1978	36.8(2.0)	37.2(2.5)	36.3(2.2)	39.3(2.2)	16.6(3.4)	34.8(5.1)
Identify expected value	1990	62.6(1.7)	69.3(2.2)	56.0(1.8)	67.7(1.5)	44.2(3.8)	51.1(9.0)
	1986	61.2(1.6)	68.5(2.1)	54.4(1.9)	65.6(1.7)	45.9(3.9)	50.8(5.4)
	1982	78.8(1.5)	83.1(1.3)	74.7(2.5)	83.2(1.5)	59.2(3.8)	61.5(3.6)
	1978	73.6(1.5)	77.3(2.2)	69.9(1.8)	76.6(1.6)	56.5(3.4)	66.2(5.8)
Compute using data in table	1990	78.8(1.2)	79.9(1.5)	77.6(1.6)	80.0(1.4)	73.3(3.5)	70.4(6.3)
	1986	75.1(1.3)	77.3(1.5)	73.1(1.4)	78.6(1.3)	59.4(3.1)	68.0(5.7)
	1982	80.0(1.4)	80.0(1.8)	80.1(1.7)	84.2(1.1)	58.4(3.5)	65.8(3.6)
	1978	77.8(1.2)	78.2(1.5)	77.3(1.5)	81.2(1.1)	58.8(3.2)	66.7(6.4)
Interpret data in table	1990	88.6(1.0)	88.7(1.2)	88.5(1.3)	91.6(1.0)	80.5(3.4)	70.4(6.9)
	1986	87.9(1.1)	90.0(1.4)	85.9(1.3)	91.1(1.2)	76.0(2.8)	76.9(2.7)
	1982	87.8(1.0)	89.6(1.1)	86.2(1.6)	91.4(0.8)	70.4(3.5)	74.6(4.3)
	1978	87.4(1.3)	88.7(1.2)	86.0(1.8)	91.7(0.9)	62.8(3.8)	70.7(4.9)
Understand decimal place value	1990	76.6(1.4)	78.0(2.1)	75.3(1.5)	81.4(1.7)	58.0(4.3)	61.6(5.0)
	1986	70.5(1.3)	73.1(2.1)	68.2(1.5)	76.6(1.2)	41.8(4.9)	55.5(3.7)
	1982	73.3(1.7)	75.2(1.6)	71.6(2.0)	79.6(1.3)	41.0(3.6)	53.7(3.6)
	1978	73.2(1.8)	73.0(3.0)	73.3(2.0)	78.7(1.9)	41.1(3.6)	57.6(4.3)

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NAEP 1990 MATHEMATICS TREND ASSESSMENT—AGE 17

Percentage of Students Responding Correctly to Mathematics Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
Understand decimal place value	1990	74.1(1.5)	77.2(2.0)	70.9(1.8)	77.4(1.5)	61.8(5.6)	57.2(8.2)
	1986	69.4(1.7)	71.7(2.1)	67.4(2.1)	74.7(1.5)	48.1(4.9)	51.0(5.4)
	1982	71.6(1.7)	73.7(1.7)	69.7(2.5)	75.9(1.7)	46.7(4.5)	62.6(3.3)
	1978	72.3(2.0)	72.1(2.8)	72.5(2.1)	76.3(2.2)	52.5(4.1)	52.6(7.5)
Divide integers	1990	80.8(1.4)	78.2(1.7)	83.4(1.5)	82.2(1.5)	75.7(3.9)	69.9(6.2)
	1986	76.3(1.7)	75.0(2.4)	77.4(1.7)	78.2(1.8)	67.5(3.4)	66.3(6.1)
	1982	68.6(2.1)	70.0(2.4)	67.3(2.6)	71.2(2.5)	55.6(2.8)	55.7(3.7)
	1978	67.1(1.8)	64.5(2.6)	69.8(1.6)	69.3(2.2)	50.5(4.4)	64.5(2.9)
Divide integers	1990	67.4(1.6)	66.4(2.1)	68.5(1.8)	69.7(1.7)	59.1(5.8)	52.5(8.1)
	1986	61.6(1.7)	63.6(2.3)	59.8(2.1)	65.6(1.7)	43.8(3.6)	45.0(4.4)
	1982	60.2(2.2)	62.0(2.5)	58.6(2.5)	63.2(2.7)	42.8(3.6)	49.7(3.3)
	1978	56.2(2.2)	55.1(2.8)	57.4(2.0)	59.5(2.5)	36.7(4.0)	46.8(4.8)
Understand opposite of integer	1990	72.0(1.8)	70.8(2.4)	73.3(1.9)	74.0(2.2)	63.5(4.9)	64.5(4.0)
	1986	68.0(1.6)	69.4(1.9)	66.7(2.1)	71.6(1.5)	52.1(4.4)	54.6(4.8)
	1982	67.5(2.0)	69.1(2.5)	66.0(2.1)	72.0(1.3)	46.1(4.1)	46.2(***)
	1978	72.0(1.6)	72.5(1.8)	71.5(1.9)	75.7(1.8)	50.9(2.8)	53.8(5.3)
Understand opposite of integer	1990	73.5(1.5)	72.2(2.1)	74.8(1.7)	76.6(1.7)	62.8(4.4)	60.5(4.4)
	1986	71.2(1.5)	69.6(2.0)	72.7(1.8)	74.3(1.6)	56.7(4.4)	57.1(4.6)
	1982	70.5(1.9)	69.4(2.2)	71.6(2.2)	75.1(1.6)	48.1(3.4)	53.0(6.7)
	1978	71.7(1.7)	70.7(1.6)	72.5(2.2)	75.8(1.7)	48.0(2.7)	51.4(6.3)
Convert decimal to fraction	1990	52.9(1.6)	52.3(2.1)	53.5(2.0)	57.1(1.4)	37.8(4.9)	35.0(5.5)
	1986	50.2(2.1)	50.5(2.7)	49.9(2.5)	53.7(2.4)	37.2(2.5)	34.5(5.1)
	1982	59.8(2.3)	58.0(2.2)	61.4(3.0)	65.8(2.3)	33.7(3.2)	30.7(3.7)
	1978	61.7(1.9)	61.4(2.3)	62.1(2.3)	65.3(2.2)	42.9(2.8)	43.0(6.9)
Convert decimal to fraction	1990	24.2(2.1)	30.4(2.7)	17.9(2.1)	26.8(2.3)	11.6(5.0)	9.8(2.8)
	1986	19.0(1.9)	24.1(2.6)	14.2(1.9)	21.0(2.2)	11.5(2.5)	9.1(2.8)
	1982	20.4(1.5)	24.8(2.3)	16.3(1.2)	23.1(1.8)	7.1(1.3)	8.9(1.8)
	1978	24.7(1.5)	30.5(2.1)	19.3(1.7)	27.3(1.6)	8.7(2.1)	14.5(3.8)

DATA APPENDIX

READING

NAEP 1990 READING TREND ASSESSMENT—AGE 9

Average Reading Proficiency Across Assessment Years

	1971	1975	1980	1984	1988	1990
-- TOTAL --	207.6(1.0)	210.0(0.7)	215.0(1.0)	210.9(0.7)	211.8(1.1)	209.2(1.2)
SEX						
MALE	201.2(1.1)	204.3(0.8)	210.0(1.1)	207.5(0.8)	207.5(1.4)	204.0(1.7)
FEMALE	213.9(1.0)	215.8(0.8)	220.1(1.1)	214.2(0.8)	216.3(1.3)	214.5(1.2)
RACE/ETHNICITY						
WHITE	214.0(0.9)	216.6(0.7)	221.3(0.8)	218.2(0.8)	217.7(1.4)	217.0(1.3)
BLACK	170.1(1.7)	181.2(1.2)	189.3(1.8)	185.7(1.1)	188.5(2.4)	181.8(2.9)
HISPANIC	*****(0.0)	182.7(2.2)	190.2(2.3)	187.2(2.1)	193.7(3.5)	189.4(2.3)
OTHER	193.5(3.8)	207.8(4.1)	218.5(3.8)	223.8(2.5)	228.4(5.4)	205.5(4.4)
REGION						
NORTHEAST	213.0(1.7)	214.8(1.3)	221.1(2.1)	215.7(1.7)	215.2(2.6)	217.4(2.2)
SOUTHEAST	193.9(2.9)	201.1(1.2)	210.3(2.3)	204.3(1.6)	207.2(2.1)	197.4(3.2)
CENTRAL	214.9(1.2)	215.5(1.2)	216.7(1.4)	215.3(1.5)	218.2(2.2)	212.7(2.0)
WEST	205.0(2.0)	207.0(2.0)	212.8(1.8)	207.8(1.5)	207.9(2.6)	209.6(2.8)
TYPE OF COMMUNITY						
EXTREME RURAL	200.2(3.3)	204.2(2.5)	211.8(1.7)	201.2(3.4)	213.7(4.2)	209.4(4.5)
DISADVANTAGED URBAN	179.2(2.7)	184.2(2.5)	187.6(2.1)	191.5(1.6)	192.0(5.5)	186.1(4.7)
ADVANTAGED URBAN	229.8(1.3)	227.3(1.5)	232.5(1.4)	230.8(1.7)	222.4(2.7)	227.1(3.3)
OTHER	207.8(1.1)	210.9(0.8)	214.5(1.1)	211.3(0.8)	211.3(1.4)	209.8(1.5)
PARENTS' EDUCATION LEVEL						
NOT GRADUATED H.S.	188.6(1.5)	189.9(1.3)	194.3(1.6)	195.1(1.4)	192.5(4.9)	192.6(3.2)
GRADUATED H.S.	207.8(1.2)	211.3(0.9)	213.0(1.3)	208.9(1.0)	210.8(2.2)	209.1(1.8)
POST H.S.	223.9(1.1)	221.5(0.9)	226.0(1.1)	222.9(0.9)	220.0(1.7)	217.7(2.0)
DO NOT KNOW	197.4(1.0)	203.1(0.8)	206.1(1.0)	204.4(0.7)	204.4(1.5)	201.4(1.5)
TYPE OF SCHOOL						
PUBLIC	*****(0.0)	*****(0.0)	213.5(1.1)	209.4(0.8)	210.2(1.2)	207.5(1.4)
PRIVATE	*****(0.0)	*****(0.0)	227.0(1.8)	222.8(1.6)	223.4(3.0)	228.3(3.3)
QUARTILES						
UPPER	252.6(0.5)	251.3(0.7)	255.0(0.8)	257.9(0.4)	259.1(1.6)	261.3(1.1)
MIDDLE TWO	210.6(0.4)	213.1(0.3)	218.0(0.3)	211.8(0.3)	212.8(0.7)	209.4(0.6)
LOWER	156.6(0.7)	162.8(0.5)	169.3(1.0)	161.6(0.6)	162.7(1.6)	156.5(1.5)

NAEP 1990 READING TREND ASSESSMENT—AGE 13

Average Reading Proficiency Across Assessment Years

	1971	1975	1980	1984	1988	1990
-- TOTAL --	255.2(0.9)	255.9(0.8)	258.5(0.9)	257.1(0.5)	257.5(1.0)	256.8(0.8)
SEX						
MALE	249.6(1.0)	249.6(0.8)	254.3(1.1)	252.6(0.6)	251.8(1.3)	250.5(1.1)
FEMALE	260.8(0.9)	262.3(0.9)	262.6(0.9)	261.7(0.6)	263.0(1.0)	263.1(1.1)
RACE/ETHNICITY						
WHITE	260.9(0.7)	262.1(0.7)	264.4(0.7)	262.6(0.6)	261.3(1.1)	262.3(0.9)
BLACK	222.4(1.2)	225.7(1.2)	232.8(1.5)	236.3(1.0)	242.9(2.4)	241.5(2.2)
HISPANIC	*****(0.0)	232.5(3.0)	237.2(2.0)	239.6(1.7)	240.1(3.5)	237.8(2.3)
OTHER	251.3(3.0)	255.6(3.4)	253.7(6.4)	260.0(2.8)	269.3(4.2)	252.7(5.3)
REGION						
NORTHEAST	261.1(2.0)	258.5(1.8)	260.0(1.8)	260.4(0.6)	258.6(2.4)	258.9(1.8)
SOUTHEAST	244.7(1.7)	249.3(1.5)	252.6(1.6)	256.4(1.5)	257.6(2.2)	255.5(2.2)
CENTRAL	260.1(1.8)	261.5(1.4)	264.5(1.4)	258.8(1.0)	255.9(2.0)	257.4(1.5)
WEST	253.6(1.3)	253.2(1.7)	256.4(2.0)	253.8(0.9)	257.9(2.1)	255.6(1.6)
TYPE OF COMMUNITY						
EXTREME RURAL	247.4(2.7)	248.5(2.1)	254.8(1.9)	254.9(1.9)	262.4(2.9)	251.2(4.7)
DISADVANTAGED URBAN	234.3(1.7)	230.3(2.7)	241.6(3.8)	238.9(1.9)	239.0(3.0)	241.0(3.2)
ADVANTAGED URBAN	272.9(1.4)	272.7(1.4)	276.8(1.4)	274.5(2.2)	266.3(3.3)	270.1(3.2)
OTHER	255.4(0.8)	257.1(0.9)	257.9(0.9)	257.1(0.6)	257.3(1.2)	257.5(0.9)
PARENTS' EDUCATION LEVEL						
NOT GRADUATED H.S.	238.4(1.3)	238.7(1.2)	238.5(1.1)	240.0(0.9)	246.5(2.1)	240.8(1.8)
GRADUATED H.S	255.5(0.8)	254.6(0.7)	253.5(0.9)	253.4(0.7)	252.7(1.2)	251.4(0.9)
POST H.S.	270.2(0.8)	269.8(0.8)	270.9(0.8)	267.6(0.7)	265.3(1.4)	266.9(1.0)
DO NOT KNOW	233.1(1.0)	234.8(1.1)	233.3(1.7)	236.5(1.3)	240.4(3.0)	237.7(1.9)
TYPE OF SCHOOL						
PUBLIC	*****(0.0)	*****(0.0)	256.9(1.1)	255.2(0.6)	256.1(1.0)	255.0(0.8)
PRIVATE	*****(0.0)	*****(0.0)	270.6(1.5)	271.2(1.7)	268.3(2.8)	269.7(2.9)
QUARTILES						
UPPER	293.2(0.4)	296.4(0.4)	294.1(0.5)	296.2(0.5)	295.8(1.0)	296.8(0.8)
MIDDLE TWO	257.6(0.4)	258.1(0.4)	260.5(0.3)	258.4(0.2)	258.5(0.7)	257.9(0.5)
LOWER	212.4(0.7)	211.3(0.5)	218.7(0.7)	214.5(0.5)	217.2(1.0)	214.5(0.9)

NAEP 1990 READING TREND ASSESSMENT—AGE 17

Average Reading Proficiency Across Assessment Years

	1971	1975	1980	1984	1988	1990
-- TOTAL --	285.2(1.2)	285.6(0.8)	285.5(1.2)	288.8(0.6)	290.1(1.0)	290.2(1.1)
SEX						
MALE	278.9(1.2)	279.7(1.0)	281.8(1.3)	283.8(0.6)	286.0(1.5)	284.0(1.6)
FEMALE	291.3(1.3)	291.2(1.0)	289.2(1.2)	293.9(0.8)	293.8(1.5)	296.5(1.2)
RACE/ETHNICITY						
WHITE	291.4(1.0)	293.0(0.6)	292.8(0.9)	295.2(0.7)	294.7(1.2)	296.6(1.2)
BLACK	238.7(1.7)	240.6(2.0)	243.1(1.8)	264.3(1.0)	274.4(2.4)	267.3(2.3)
HISPANIC	*****(0.0)	252.4(3.6)	261.4(2.7)	268.1(2.2)	270.8(4.3)	274.8(3.6)
OTHER	275.9(4.8)	274.3(4.4)	280.4(3.0)	284.7(3.1)	290.0(5.3)	290.1(3.5)
REGION						
NORTHEAST	291.3(2.8)	289.1(1.7)	285.9(2.4)	292.2(1.9)	294.8(2.9)	295.7(1.8)
SOUTHEAST	270.5(2.4)	276.5(1.4)	280.1(2.2)	284.7(1.6)	285.5(2.1)	285.1(2.5)
CENTRAL	290.7(2.1)	291.8(1.4)	287.4(2.2)	290.0(1.4)	291.2(1.9)	293.5(2.4)
WEST	283.7(1.8)	281.6(1.9)	287.3(2.1)	288.4(1.1)	289.0(1.8)	286.8(2.6)
TYPE OF COMMUNITY						
EXTREME RURAL	276.8(3.4)	282.0(2.6)	279.0(3.2)	282.7(3.2)	286.6(5.2)	289.9(3.4)
DISADVANTAGED URBAN	259.7(2.6)	258.8(4.2)	258.1(3.0)	265.7(2.1)	275.0(2.6)	273.3(4.8)
ADVANTAGED URBAN	305.9(2.0)	305.3(1.5)	300.8(2.2)	302.2(2.2)	301.0(1.8)	299.9(3.8)
OTHER	285.2(1.0)	287.5(0.9)	286.6(1.0)	289.6(0.6)	288.3(1.1)	290.9(1.2)
PARENTS' EDUCATION LEVEL						
NOT GRADUATED H.S.	261.3(1.5)	262.5(1.3)	262.1(1.5)	269.4(1.1)	267.4(2.0)	269.7(2.8)
GRADUATED H.S.	283.0(1.2)	281.4(1.1)	277.5(1.0)	281.2(0.7)	282.0(1.3)	282.9(1.4)
POST H.S.	302.2(1.0)	300.6(0.7)	298.9(1.0)	301.2(0.7)	299.5(1.3)	299.9(1.1)
DO NOT KNOW	261.1(5.0)	239.8(2.8)	249.8(3.5)	256.5(2.0)	254.7(6.2)	245.9(5.7)
TYPE OF SCHOOL						
PUBLIC	*****(0.0)	*****(0.0)	284.4(1.2)	287.2(0.6)	288.7(1.0)	288.6(1.1)
PRIVATE	*****(0.0)	*****(0.0)	298.4(2.7)	303.0(2.0)	299.6(3.8)	311.0(4.2)
QUARTILES						
UPPER	332.5(0.6)	334.0(0.5)	326.8(0.8)	331.4(0.5)	330.1(1.3)	335.5(1.1)
MIDDLE TWO	289.0(0.5)	288.4(0.4)	288.7(0.4)	290.7(0.3)	292.1(0.7)	292.1(0.5)
LOWER	230.2(0.8)	231.5(1.0)	237.6(1.0)	240.8(0.3)	246.0(1.1)	241.1(1.6)

NAEP 1990 READING TREND ASSESSMENT—AGE 9

Percentage of Students with Reading Proficiency At or Above Anchor Level 150

	1971	1975	1980	1984	1988	1990
--TOTAL --	90.6(0.5)	93.1(0.4)	94.6(0.4)	92.3(0.3)	92.7(0.7)	90.1(0.9)
SEX						
MALE	87.9(0.7)	91.0(0.5)	92.9(0.5)	90.4(0.5)	90.4(0.9)	87.9(1.4)
FEMALE	93.2(0.5)	95.3(0.3)	96.4(0.4)	94.2(0.4)	94.9(1.0)	92.4(1.1)
RACE/ETHNICITY						
WHITE	94.0(0.4)	96.0(0.3)	97.1(0.2)	95.4(0.3)	95.1(0.7)	93.5(0.9)
BLACK	69.7(1.7)	80.7(1.1)	84.9(1.4)	81.3(1.0)	83.2(2.4)	76.9(2.7)
HISPANIC	****(0.0)	80.8(2.5)	84.5(1.8)	82.0(2.1)	85.6(3.5)	83.7(1.8)
OTHER	86.0(1.9)	92.4(1.9)	96.1(1.2)	95.4(1.1)	96.9(1.8)	89.3(3.1)
REGION						
NORTHEAST	93.4(0.9)	94.1(0.5)	96.4(0.7)	94.2(0.6)	92.8(1.3)	92.6(1.6)
SOUTHEAST	82.7(1.9)	89.8(0.8)	93.0(0.9)	89.7(0.8)	91.3(1.7)	84.5(2.4)
CENTRAL	93.6(0.5)	95.6(0.5)	95.8(0.7)	94.3(0.6)	95.4(0.7)	92.7(1.4)
WEST	91.0(1.1)	92.4(1.0)	93.6(0.8)	90.9(0.9)	91.5(1.6)	90.6(1.3)
TYPE OF COMMUNITY						
EXTREME RURAL	86.5(1.9)	90.2(1.5)	94.4(1.1)	87.5(2.1)	92.9(3.4)	89.3(2.6)
DISADVANTAGED URBAN	75.8(2.4)	81.4(1.7)	83.4(2.1)	84.0(1.3)	84.0(4.0)	78.9(3.2)
ADVANTAGED URBAN	97.8(0.4)	98.2(0.4)	98.9(0.3)	98.1(0.4)	97.2(1.0)	97.0(1.1)
OTHER	91.4(0.6)	94.0(0.4)	94.8(0.5)	93.2(0.4)	92.5(1.0)	90.8(1.1)
PARENTS' EDUCATION LEVEL						
NOT GRADUATED H.S.	82.3(1.4)	84.4(1.2)	85.6(1.5)	86.2(1.3)	84.4(4.4)	83.0(3.8)
GRADUATED H.S.	92.1(0.7)	94.2(0.5)	94.9(0.6)	92.8(0.7)	92.3(2.1)	91.2(1.3)
POST H.S.	96.1(0.4)	96.5(0.4)	97.3(0.4)	95.4(0.4)	95.1(0.8)	92.6(1.2)
DO NOT KNOW	86.7(0.7)	91.5(0.5)	92.7(0.9)	91.0(0.4)	90.9(1.2)	87.6(1.4)
TYPE OF SCHOOL						
PUBLIC	*****(0.0)	*****(0.0)	94.2(0.4)	91.7(0.4)	92.1(0.8)	89.6(1.0)
PRIVATE	*****(0.0)	*****(0.0)	98.1(0.4)	96.8(0.5)	96.7(1.3)	96.2(1.7)
QUARTILES						
UPPER	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)
MIDDLE TWO	99.6(0.1)	100.0(0.0)	99.9(0.1)	99.9(0.1)	99.7(0.2)	99.1(0.5)
LOWER	63.1(1.1)	72.6(1.0)	78.7(1.2)	69.7(0.9)	71.3(2.3)	62.2(3.0)

NAEP 1990 READING TREND ASSESSMENT—AGE 9

Percentage of Students with Reading Proficiency At or Above Anchor Level 200

	1971	1975	1980	1984	1988	1990
-- TOTAL --	58.7(1.0)	62.1(0.8)	67.7(1.0)	61.5(0.7)	62.6(1.3)	58.9(1.3)
SEX						
MALE	52.7(1.2)	56.2(1.0)	62.7(1.1)	58.0(0.9)	58.4(1.8)	53.8(1.9)
FEMALE	64.6(1.1)	68.1(0.8)	72.7(1.0)	65.2(0.8)	66.9(1.4)	64.2(1.2)
RACE/ETHNICITY						
WHITE	65.0(1.0)	69.0(0.8)	74.2(0.7)	68.6(0.8)	68.4(1.6)	66.0(1.4)
BLACK	22.0(1.5)	31.6(1.5)	41.3(1.9)	36.6(1.5)	39.4(2.9)	33.9(3.4)
HISPANIC	****(0.0)	34.6(3.0)	41.6(2.6)	39.6(2.2)	45.9(3.3)	40.9(2.7)
OTHER	42.0(5.2)	58.8(5.3)	72.9(3.7)	72.7(2.9)	77.1(4.8)	56.8(4.5)
REGION						
NORTHEAST	64.1(1.6)	66.8(1.5)	73.5(2.1)	66.5(1.5)	65.7(2.5)	65.4(2.8)
SOUTHEAST	45.9(2.8)	53.1(1.2)	62.6(2.4)	54.8(1.6)	58.0(2.6)	48.2(3.3)
CENTRAL	65.7(1.4)	67.4(1.3)	69.4(1.2)	66.0(1.6)	68.4(1.7)	62.6(2.0)
WEST	55.6(1.8)	59.5(2.1)	65.9(1.5)	58.9(1.5)	59.5(3.5)	59.6(2.9)
TYPE OF COMMUNITY						
EXTREME RURAL	51.2(3.2)	56.3(2.7)	64.4(2.0)	53.2(3.0)	64.5(4.1)	59.1(4.4)
DISADVANTAGED URBAN	30.9(2.8)	34.6(2.9)	39.7(2.0)	42.5(1.8)	43.3(5.7)	37.5(6.3)
ADVANTAGED URBAN	79.0(1.4)	79.5(1.8)	84.0(1.2)	80.3(1.7)	72.9(3.2)	74.4(3.4)
OTHER	59.2(1.1)	63.1(0.9)	67.4(1.0)	62.2(0.9)	62.1(1.8)	59.6(1.4)
PARENTS' EDUCATION LEVEL						
NOT GRADUATED H.S.	39.4(1.7)	41.8(1.4)	47.5(1.6)	47.4(2.1)	44.0(7.1)	42.8(4.1)
GRADUATED H.S.	59.6(1.3)	64.1(1.0)	66.5(1.3)	60.0(1.3)	62.7(3.4)	59.4(2.9)
POST H.S.	73.7(1.1)	73.3(1.0)	77.8(1.1)	71.9(0.9)	69.7(1.3)	65.9(2.0)
DO NOT KNOW	49.3(1.2)	55.1(1.0)	59.0(1.1)	55.9(1.0)	56.1(1.9)	52.7(1.9)
TYPE OF SCHOOL						
PUBLIC	****(0.0)	*****(0.0)	66.2(1.0)	60.0(0.8)	61.1(1.5)	57.5(1.5)
PRIVATE	****(0.0)	*****(0.0)	79.3(1.8)	73.9(1.7)	73.5(2.5)	74.8(3.0)
QUARTILES						
UPPER	98.7(0.3)	99.2(0.2)	99.6(0.2)	99.8(0.1)	99.7(0.3)	99.7(0.3)
MIDDLE TWO	66.4(1.0)	72.8(0.5)	80.6(0.6)	70.2(0.6)	72.4(1.1)	65.8(1.3)
LOWER	3.0(0.5)	3.8(0.4)	9.9(0.9)	5.0(0.4)	6.0(1.2)	4.3(1.1)

NAEP 1990 READING TREND ASSESSMENT—AGE 9

Percentage of Students with Reading Proficiency At or Above Anchor Level 250

	1971	1975	1980	1984	1988	1990
-- TOTAL --	15.6(0.6)	14.6(0.6)	17.7(0.8)	17.2(0.6)	17.5(1.1)	18.4(1.0)
SEX						
MALE	12.0(0.6)	11.5(0.6)	14.6(0.9)	15.9(0.7)	15.8(1.4)	16.1(1.2)
FEMALE	19.2(0.8)	17.7(0.8)	20.7(1.0)	18.4(0.7)	19.1(1.2)	20.8(1.2)
RACE/ETHNICITY						
WHITE	18.0(0.7)	17.4(0.7)	21.0(0.9)	20.9(0.7)	20.3(1.5)	22.6(1.2)
BLACK	1.6(0.5)	2.0(0.3)	4.1(0.6)	4.5(0.5)	5.6(1.2)	5.2(1.5)
HISPANIC	****(0.0)	2.6(0.5)	5.0(1.4)	4.3(0.6)	8.6(2.3)	5.8(2.0)
OTHER	8.7(2.1)	14.5(3.5)	18.7(4.3)	24.7(2.6)	29.8(6.9)	13.1(3.9)
REGION						
NORTHEAST	17.9(0.9)	17.7(1.0)	21.6(2.2)	19.8(1.3)	20.8(1.9)	23.9(1.9)
SOUTHEAST	10.2(1.1)	9.9(0.8)	15.3(1.5)	13.8(0.9)	14.7(1.4)	12.8(2.7)
CENTRAL	19.7(0.9)	17.2(1.2)	17.9(1.1)	19.2(1.3)	20.7(3.2)	19.3(2.0)
WEST	13.0(1.4)	12.7(1.2)	16.4(1.5)	15.9(1.0)	14.5(1.1)	18.1(2.1)
TYPE OF COMMUNITY						
EXTREME RURAL	12.4(1.6)	12.0(1.6)	14.8(1.5)	11.3(1.5)	18.9(4.8)	19.6(3.7)
DISADVANTAGED URBAN	3.7(0.7)	3.7(0.8)	4.2(0.7)	8.1(0.9)	7.9(2.2)	6.7(2.0)
ADVANTAGED URBAN	30.3(1.3)	25.7(1.5)	31.1(2.3)	30.9(1.8)	22.0(3.0)	29.0(3.5)
OTHER	14.9(0.7)	14.4(0.7)	16.6(0.7)	16.5(0.6)	17.2(1.1)	18.3(1.1)
PARENTS' EDUCATION LEVEL						
NOT GRADUATED H.S.	6.1(0.8)	5.2(0.7)	6.7(1.0)	6.6(0.7)	6.3(2.1)	9.1(2.2)
GRADUATED H.S.	13.7(0.8)	14.0(0.9)	15.0(1.1)	14.3(0.9)	16.8(2.0)	17.2(1.4)
POST H.S.	26.1(1.1)	22.3(0.9)	25.9(1.1)	26.3(0.8)	22.8(1.6)	24.3(1.7)
DO NOT KNOW	9.6(0.5)	9.7(0.6)	11.0(0.8)	11.8(0.6)	12.3(1.3)	13.2(1.5)
TYPE OF SCHOOL						
PUBLIC	****(0.0)	*****(0.0)	16.7(0.9)	16.3(0.6)	16.6(0.9)	17.2(1.0)
PRIVATE	****(0.0)	*****(0.0)	25.6(1.7)	23.6(1.7)	23.6(3.5)	32.4(4.3)
QUARTILES						
UPPER	52.6(0.9)	50.5(1.6)	58.1(1.7)	61.0(1.0)	63.1(3.2)	66.0(1.9)
MIDDLE TWO	5.0(0.3)	3.9(0.3)	6.3(0.4)	3.6(0.3)	3.3(0.6)	3.8(0.5)
LOWER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.2)	0.0(0.0)

NAEP 1990 READING TREND ASSESSMENT—AGE 9

Percentage of Students with Reading Proficiency At or Above Anchor Level 300

	1971	1975	1980	1984	1988	1990
-- TOTAL --	0.9(0.1)	0.6(0.1)	0.6(0.1)	1.0(0.1)	1.4(0.3)	1.7(0.3)
SEX						
MALE	0.6(0.2)	0.3(0.1)	0.4(0.1)	0.8(0.2)	1.1(0.4)	1.4(0.3)
FEMALE	1.3(0.2)	0.9(0.2)	0.8(0.1)	1.1(0.1)	1.6(0.4)	2.0(0.5)
RACE/ETHNICITY						
WHITE	1.1(0.2)	0.7(0.1)	0.8(0.1)	1.2(0.2)	1.6(0.3)	2.2(0.4)
BLACK	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.1(0.1)	0.2(0.2)	0.3(0.2)
HISPANIC	***(0.0)	0.0(0.0)	0.0(0.0)	0.1(0.0)	0.4(0.0)	0.2(0.3)
OTHER	0.5(0.5)	0.9(0.9)	0.5(0.0)	1.9(0.6)	4.0(2.7)	0.7(0.8)
REGION						
NORTHEAST	1.1(0.3)	0.9(0.3)	0.8(0.2)	1.4(0.3)	1.7(0.4)	2.7(0.7)
SOUTHEAST	0.4(0.2)	0.3(0.2)	0.6(0.3)	0.6(0.2)	0.8(0.4)	1.0(0.5)
CENTRAL	1.3(0.3)	0.7(0.2)	0.6(0.2)	1.1(0.2)	1.9(1.1)	1.6(0.5)
WEST	0.7(0.2)	0.4(0.2)	0.5(0.2)	0.8(0.2)	1.1(0.4)	1.6(0.4)
TYPE OF COMMUNITY						
EXTREME RURAL	0.8(0.2)	0.4(0.2)	0.4(0.2)	0.5(0.3)	1.6(1.2)	1.5(0.8)
DISADVANTAGED URBAN	0.1(0.1)	0.1(0.0)	0.1(0.1)	0.3(0.2)	0.4(0.0)	0.7(0.5)
ADVANTAGED URBAN	2.7(0.7)	1.5(0.4)	1.7(0.4)	2.6(0.6)	2.0(0.9)	3.8(0.8)
OTHER	0.7(0.1)	0.5(0.1)	0.5(0.1)	0.8(0.1)	1.3(0.3)	1.5(0.4)
PARENTS' EDUCATION LEVEL						
NOT GRADUATED H.S.	0.2(0.1)	0.1(0.1)	0.1(0.1)	0.2(0.6)	0.0(0.0)	0.5(0.7)
GRADUATED H.S.	0.6(0.2)	0.5(0.2)	0.4(0.1)	0.6(0.2)	0.9(0.8)	1.3(0.7)
POST H.S.	2.0(0.3)	1.2(0.2)	1.1(0.2)	2.0(0.3)	2.2(0.7)	2.7(0.6)
DO NOT KNOW	0.4(0.1)	0.2(0.1)	0.3(0.1)	0.4(0.1)	0.6(0.3)	0.8(0.4)
TYPE OF SCHOOL						
PUBLIC	***(0.0)	***(0.0)	0.6(0.1)	0.9(0.1)	1.2(0.3)	1.6(0.3)
PRIVATE	***(0.0)	***(0.0)	1.1(0.5)	1.4(0.4)	2.4(1.1)	2.6(1.1)
QUARTILES						
UPPER	3.7(0.5)	2.4(0.3)	2.5(0.4)	3.9(0.5)	5.4(1.3)	6.7(1.2)
MIDDLE TWO	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
LOWER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)

NAEP 1990 READING TREND ASSESSMENT—AGE 9

Percentage of Students with Reading Proficiency At or Above Anchor Level 350

	1971	1975	1980	1984	1988	1990
-- TOTAL --	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.1)
SEX						
MALE	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
FEMALE	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.1)	0.1(0.1)
RACE/ETHNICITY						
WHITE	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.1)
BLACK	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
HISPANIC	****(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
OTHER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.1(0.0)	0.0(0.0)	0.0(0.0)
REGION						
NORTHEAST	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.1)
SOUTHEAST	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.1)	0.0(0.1)
CENTRAL	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
WEST	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.1)
TYPE OF COMMUNITY						
EXTREME RURAL	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.1(0.0)	0.0(0.0)
DISADVANTAGED URBAN	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
ADVANTAGED URBAN	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.1(0.2)	0.0(0.2)
OTHER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.1)
PARENTS' EDUCATION LEVEL						
NOT GRADUATED H.S.	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
GRADUATED H.S.	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.1(0.0)	0.0(0.0)
POST H.S.	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.1)	0.1(0.1)
DO NOT KNOW	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.1)
TYPE OF SCHOOL						
PUBLIC	****(0.0)	*****(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.1)
PRIVATE	****(0.0)	*****(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
QUARTILES						
UPPER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.1(0.1)	0.1(0.2)
MIDDLE TWO	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
LOWER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)

NAEP 1990 READING TREND ASSESSMENT—AGE 13

Percentage of Students with Reading Proficiency At or Above Anchor Level 150

	1971	1975	1980	1984	1988	1990
-- TOTAL --	99.8(0.0)	99.7(0.1)	99.9(0.1)	99.8(0.0)	99.9(0.1)	99.8(0.1)
SEX						
MALE	99.6(0.1)	99.6(0.1)	99.8(0.1)	99.7(0.1)	99.7(0.2)	99.7(0.2)
FEMALE	99.9(0.1)	99.9(0.1)	99.9(0.0)	99.9(0.1)	100.0(0.0)	99.9(0.1)
RACE/ETHNICITY						
WHITE	99.9(0.0)	99.9(0.0)	100.0(0.0)	99.9(0.0)	99.9(0.1)	99.9(0.1)
BLACK	98.6(0.3)	98.4(0.3)	99.3(0.3)	99.4(0.2)	99.8(0.3)	99.4(0.5)
HISPANIC	****(0.0)	99.6(0.3)	99.7(0.3)	99.5(0.4)	99.2(0.8)	99.1(0.5)
OTHER	99.8(0.3)	99.5(0.0)	99.9(0.4)	99.8(0.0)	100.0(0.0)	100.0(0.0)
REGION						
NORTHEAST	99.9(0.1)	99.8(0.1)	99.9(0.1)	99.9(0.1)	99.9(0.2)	99.9(0.1)
SOUTHEAST	99.4(0.2)	99.6(0.1)	99.7(0.1)	99.8(0.1)	99.9(0.0)	99.6(0.3)
CENTRAL	99.9(0.1)	99.8(0.1)	100.0(0.1)	99.9(0.1)	99.9(0.0)	99.9(0.1)
WEST	99.8(0.1)	99.6(0.2)	99.9(0.1)	99.7(0.1)	99.8(0.3)	99.7(0.2)
TYPE OF COMMUNITY						
EXTREME RURAL	99.5(0.3)	99.5(0.3)	99.9(0.1)	99.8(0.2)	100.0(0.0)	99.6(0.0)
DISADVANTAGED URBAN	99.3(0.3)	98.8(0.4)	99.6(0.3)	99.5(0.2)	99.5(0.7)	99.1(0.5)
ADVANTAGED URBAN	100.0(0.0)	100.0(0.1)	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.1)
OTHER	99.8(0.0)	99.8(0.0)	99.9(0.1)	99.8(0.1)	99.9(0.1)	99.9(0.1)
PARENTS' EDUCATION LEVEL						
NOT GRADUATED H.S.	99.5(0.2)	99.4(0.2)	99.7(0.2)	99.5(0.2)	99.9(0.0)	99.5(0.4)
GRADUATED H.S.	99.9(0.0)	99.8(0.1)	99.9(0.0)	99.8(0.1)	99.8(0.2)	99.9(0.2)
POST H.S.	100.0(0.0)	99.9(0.0)	100.0(0.0)	99.9(0.0)	100.0(0.1)	99.9(0.1)
DO NOT KNOW	99.2(0.2)	99.1(0.3)	99.3(0.4)	99.5(0.2)	99.5(0.5)	99.1(0.6)
TYPE OF SCHOOL						
PUBLIC	*****(0.0)	*****(0.0)	99.9(0.1)	99.8(0.1)	99.8(0.1)	99.7(0.1)
PRIVATE	*****(0.0)	*****(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)
QUARTILES						
UPPER	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)
MIDDLE TWO	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)
LOWER	99.0(0.2)	98.8(0.2)	99.5(0.2)	99.3(0.2)	99.4(0.4)	99.1(0.4)

NAEP 1990 READING TREND ASSESSMENT—AGE 13

Percentage of Students with Reading Proficiency At or Above Anchor Level 200

	1971	1975	1980	1984	1988	1990
-- TOTAL --	93.0(0.5)	93.2(0.4)	94.8(0.4)	93.9(0.3)	94.9(0.6)	93.8(0.6)
SEX						
MALE	90.7(0.7)	90.9(0.5)	93.4(0.6)	92.2(0.4)	92.8(1.0)	91.4(0.9)
FEMALE	95.2(0.4)	95.5(0.4)	96.1(0.4)	95.8(0.3)	96.9(0.6)	96.3(0.6)
RACE/ETHNICITY						
WHITE	96.2(0.3)	96.4(0.2)	97.1(0.2)	96.2(0.3)	96.0(0.6)	96.0(0.6)
BLACK	74.2(1.7)	76.9(1.3)	84.1(1.7)	85.5(1.0)	91.3(2.2)	87.7(2.3)
HISPANIC	*****(0.0)	81.3(2.3)	86.8(2.4)	86.7(1.5)	87.4(2.6)	85.8(2.4)
OTHER	92.3(2.2)	93.3(2.0)	93.4(2.6)	95.1(1.3)	99.0(1.4)	93.3(4.2)
REGION						
NORTHEAST	95.2(0.8)	94.0(0.7)	95.6(0.8)	95.4(0.3)	95.1(1.3)	95.1(1.1)
SOUTHEAST	87.2(1.4)	89.9(1.0)	92.0(0.8)	92.8(0.6)	95.9(1.1)	92.8(2.0)
CENTRAL	95.4(0.7)	95.8(0.4)	97.1(0.6)	95.5(0.5)	94.6(1.2)	95.0(0.8)
WEST	93.4(0.8)	92.4(1.0)	94.2(1.1)	92.6(0.7)	94.0(1.2)	92.7(0.9)
TYPE OF COMMUNITY						
EXTREME RURAL	88.1(2.6)	91.0(1.4)	93.6(1.1)	94.1(1.1)	96.8(1.7)	90.9(3.5)
DISADVANTAGED URBAN	82.7(1.6)	78.7(2.4)	87.6(2.1)	86.6(1.6)	89.0(1.9)	87.2(1.9)
ADVANTAGED URBAN	98.6(0.3)	98.5(0.5)	98.9(0.3)	98.6(0.3)	97.0(1.2)	97.9(1.3)
OTHER	93.7(0.5)	94.2(0.4)	95.1(0.5)	94.1(0.3)	94.9(0.7)	94.4(0.7)
PARENTS' EDUCATION LEVEL						
NOT GRADUATED H.S.	86.6(1.3)	85.7(1.0)	87.8(1.1)	88.0(0.9)	93.3(2.0)	88.3(2.6)
GRADUATED H.S.	94.9(0.5)	94.6(0.4)	95.1(0.5)	93.9(0.5)	95.0(0.8)	93.7(0.9)
POST H.S.	98.0(0.2)	97.7(0.3)	98.2(0.3)	97.1(0.2)	96.5(0.6)	96.6(0.6)
DO NOT KNOW	82.2(1.2)	83.3(1.0)	83.9(1.5)	84.3(1.0)	87.5(2.9)	86.3(2.9)
TYPE OF SCHOOL						
PUBLIC	*****(0.0)	*****(0.0)	94.3(0.5)	93.4(0.3)	94.5(0.6)	93.2(0.7)
PRIVATE	*****(0.0)	*****(0.0)	98.5(0.5)	98.3(0.4)	97.8(1.0)	98.6(0.5)
QUARTILES						
UPPER	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)
MIDDLE TWO	99.8(0.1)	100.0(0.0)	99.8(0.1)	99.9(0.1)	99.9(0.1)	99.9(0.1)
LOWER	72.3(1.2)	72.7(1.0)	79.5(1.1)	75.2(0.7)	79.6(1.9)	75.6(1.9)

NAEP 1990 READING TREND ASSESSMENT—AGE 13

Percentage of Students with Reading Proficiency At or Above Anchor Level 250

	1971	1975	1980	1984	1988	1990
-- TOTAL --	57.8(1.1)	58.6(1.0)	60.7(1.1)	59.0(0.6)	58.7(1.3)	58.7(1.0)
SEX						
MALE	51.6(1.2)	51.7(1.1)	55.9(1.2)	54.0(0.8)	52.3(1.9)	52.4(1.5)
FEMALE	64.0(1.1)	65.5(1.2)	65.4(1.1)	64.0(0.7)	65.0(1.4)	65.0(1.5)
RACE/ETHNICITY						
WHITE	64.2(0.9)	65.5(0.9)	67.8(0.8)	65.3(0.7)	63.7(1.5)	64.8(1.2)
BLACK	21.1(1.2)	24.8(1.6)	30.1(2.0)	34.6(1.2)	40.2(2.3)	41.7(3.5)
HISPANIC	*****(0.0)	32.0(3.6)	35.4(2.6)	39.0(2.1)	38.0(4.4)	37.2(2.9)
OTHER	51.3(4.6)	55.8(4.4)	55.5(7.5)	63.8(3.8)	66.9(6.1)	52.6(7.9)
REGION						
NORTHEAST	64.6(2.3)	62.1(2.2)	62.6(2.1)	63.2(1.1)	59.2(2.5)	60.8(2.6)
SOUTHEAST	46.3(2.0)	50.8(1.7)	54.5(1.8)	57.9(1.7)	57.7(3.5)	57.3(2.4)
CENTRAL	63.3(2.3)	64.7(1.8)	67.2(2.0)	60.8(1.4)	57.9(2.3)	59.4(2.4)
WEST	55.7(1.7)	55.2(2.1)	58.2(2.2)	55.3(0.8)	59.9(2.8)	57.5(2.0)
TYPE OF COMMUNITY						
EXTREME RURAL	50.1(3.3)	49.6(2.4)	57.1(2.3)	56.5(3.0)	64.2(4.9)	53.1(6.0)
DISADVANTAGED URBAN	33.1(2.0)	30.5(3.0)	40.9(4.8)	38.0(2.2)	36.7(3.4)	41.2(5.1)
ADVANTAGED URBAN	77.3(1.6)	77.2(1.7)	80.3(1.8)	77.4(2.2)	69.1(4.7)	72.5(3.7)
OTHER	58.1(1.1)	59.9(1.1)	60.3(1.1)	59.3(0.7)	58.6(1.4)	59.5(1.3)
PARENTS' EDUCATION LEVEL						
NOT GRADUATED H.S.	37.9(1.5)	39.2(1.6)	37.3(1.5)	39.7(1.4)	44.9(3.5)	40.6(3.5)
GRADUATED H.S.	58.7(1.2)	57.0(1.1)	55.3(1.2)	55.6(0.9)	54.5(1.9)	52.6(1.7)
POST H.S.	75.1(0.9)	74.3(1.0)	74.9(0.9)	70.6(0.8)	67.5(2.2)	70.4(1.3)
DO NOT KNOW	32.1(1.4)	34.4(1.3)	31.5(2.4)	36.1(1.8)	36.5(4.3)	35.8(2.7)
TYPE OF SCHOOL						
PUBLIC	****(0.0)	*****(0.0)	58.9(1.2)	57.0(0.7)	57.1(1.4)	56.7(1.2)
PRIVATE	****(0.0)	*****(0.0)	74.7(1.9)	74.2(1.9)	71.7(3.5)	72.9(4.7)
QUARTILES						
UPPER	98.6(0.2)	99.6(0.1)	97.7(0.2)	99.0(0.2)	99.0(0.6)	99.2(0.3)
MIDDLE TWO	64.4(0.9)	66.6(0.9)	68.7(0.5)	65.7(0.6)	65.7(1.8)	65.4(1.3)
LOWER	3.9(0.4)	1.4(0.2)	7.9(0.7)	4.3(0.4)	4.5(1.1)	4.6(0.9)

NAEP 1990 READING TREND ASSESSMENT—AGE 13

Percentage of Students with Reading Proficiency At or Above Anchor Level 300

	1971	1975	1980	1984	1988	1990
-- TOTAL --	9.8(0.5)	10.2(0.5)	11.3(0.5)	11.0(0.4)	10.9(0.8)	11.0(0.6)
SEX						
MALE	7.3(0.5)	7.0(0.4)	9.1(0.7)	9.0(0.4)	8.6(0.9)	7.6(0.8)
FEMALE	12.3(0.6)	13.5(0.7)	13.5(0.6)	13.2(0.5)	13.2(0.9)	14.5(0.9)
RACE/ETHNICITY						
WHITE	11.3(0.5)	12.1(0.5)	13.6(0.6)	13.1(0.5)	12.4(0.9)	13.3(0.9)
BLACK	0.8(0.2)	1.5(0.3)	1.8(0.5)	2.8(0.5)	4.6(1.2)	4.6(0.8)
HISPANIC	****(0.0)	2.2(1.0)	2.3(0.6)	4.1(0.7)	4.4(1.9)	3.9(1.2)
OTHER	8.5(2.1)	11.2(2.3)	9.0(3.2)	12.2(2.9)	18.4(5.1)	8.3(3.2)
REGION						
NORTHEAST	12.5(1.1)	11.1(1.3)	11.8(1.1)	12.5(0.4)	12.5(1.7)	12.1(1.4)
SOUTHEAST	6.3(0.6)	8.1(0.7)	9.0(1.1)	11.8(1.2)	10.8(1.8)	10.7(1.4)
CENTRAL	11.6(1.0)	12.4(0.9)	14.3(0.7)	10.5(0.6)	9.1(1.3)	10.0(1.6)
WEST	8.2(0.7)	8.9(0.7)	10.0(1.0)	9.5(0.8)	11.4(1.4)	11.3(1.2)
TYPE OF COMMUNITY						
EXTREME RURAL	7.3(0.9)	6.1(1.0)	9.0(1.0)	9.4(1.4)	13.2(3.3)	8.7(2.2)
DISADVANTAGED URBAN	3.3(0.7)	2.4(0.6)	4.6(1.3)	3.8(0.8)	2.8(1.3)	5.5(1.3)
ADVANTAGED URBAN	19.6(1.4)	19.3(1.7)	23.5(1.7)	21.7(2.2)	15.5(2.5)	18.9(2.4)
OTHER	9.1(0.4)	10.2(0.6)	10.3(0.5)	10.5(0.4)	10.7(0.9)	10.8(0.8)
PARENTS' EDUCATION LEVEL						
NOT GRADUATED H.S.	3.0(0.5)	3.1(0.4)	2.6(0.6)	3.5(0.5)	4.9(1.7)	4.0(1.5)
GRADUATED H.S.	7.7(0.5)	7.8(0.5)	6.5(0.4)	7.5(0.6)	6.7(1.2)	7.1(0.9)
POST H.S.	17.0(0.8)	17.2(0.7)	18.0(0.8)	17.0(0.6)	15.5(1.3)	16.3(1.3)
DO NOT KNOW	2.7(0.3)	2.8(0.5)	2.1(0.5)	2.9(0.6)	4.6(1.2)	3.3(1.2)
TYPE OF SCHOOL						
PUBLIC	*****(0.0)	*****(0.0)	10.5(0.5)	10.0(0.4)	10.1(0.8)	10.1(0.7)
PRIVATE	*****(0.0)	*****(0.0)	17.4(1.5)	19.0(1.6)	17.3(2.1)	17.2(3.0)
QUARTILES						
UPPER	35.3(0.8)	39.4(1.1)	38.1(1.2)	40.7(1.0)	39.8(2.4)	40.9(2.0)
MIDDLE TWO	1.9(0.2)	0.8(0.1)	3.6(0.3)	1.7(0.2)	1.9(0.4)	1.6(0.4)
LOWER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.1)	0.0(0.0)

NAEP 1990 READING TREND ASSESSMENT—AGE 13

Percentage of Students with Reading Proficiency At or Above Anchor Level 350

	1971	1975	1980	1984	1988	1990
-- TOTAL --	0.1(0.0)	0.2(0.0)	0.2(0.0)	0.3(0.1)	0.2(0.1)	0.4(0.1)
SEX						
MALE	0.1(0.0)	0.1(0.1)	0.2(0.1)	0.2(0.1)	0.1(0.1)	0.2(0.1)
FEMALE	0.2(0.1)	0.3(0.1)	0.3(0.1)	0.4(0.1)	0.4(0.2)	0.5(0.2)
RACE/ETHNICITY						
WHITE	0.2(0.1)	0.3(0.1)	0.3(0.1)	0.4(0.1)	0.3(0.1)	0.5(0.2)
BLACK	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.1(0.3)	0.1(0.3)
HISPANIC	*****(0.0)	0.0(0.0)	0.0(0.0)	0.1(0.1)	0.0(0.0)	0.1(0.2)
OTHER	0.2(0.0)	0.3(0.7)	0.3(0.8)	0.8(1.2)	1.2(0.0)	0.2(0.0)
REGION						
NORTHEAST	0.2(0.1)	0.3(0.1)	0.2(0.1)	0.3(0.1)	0.4(0.4)	0.5(0.3)
SOUTHEAST	0.1(0.1)	0.1(0.1)	0.2(0.1)	0.4(0.1)	0.3(0.3)	0.4(0.2)
CENTRAL	0.2(0.1)	0.3(0.1)	0.3(0.1)	0.2(0.1)	0.0(0.0)	0.3(0.2)
WEST	0.1(0.0)	0.2(0.1)	0.2(0.1)	0.3(0.1)	0.2(0.2)	0.3(0.2)
TYPE OF COMMUNITY						
EXTREME RURAL	0.1(0.1)	0.2(0.2)	0.1(0.2)	0.1(0.1)	0.1(0.0)	0.0(0.0)
DISADVANTAGED URBAN	0.0(0.0)	0.1(0.1)	0.0(0.1)	0.1(0.1)	0.0(0.0)	0.1(0.2)
ADVANTAGED URBAN	0.4(0.2)	0.6(0.2)	0.7(0.3)	0.9(0.2)	0.4(0.4)	0.9(0.5)
OTHER	0.1(0.0)	0.2(0.1)	0.2(0.1)	0.3(0.1)	0.2(0.1)	0.4(0.1)
PARENTS' EDUCATION LEVEL						
NOT GRADUATED H.S.	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.1(0.1)	0.0(0.0)	0.0(0.0)
GRADUATED H.S.	0.1(0.0)	0.1(0.1)	0.0(0.0)	0.1(0.1)	0.1(0.1)	0.1(0.1)
POST H.S.	0.3(0.1)	0.5(0.1)	0.4(0.1)	0.5(0.1)	0.4(0.1)	0.7(0.2)
DO NOT KNOW	0.0(0.0)	0.0(0.0)	0.1(0.1)	0.1(0.0)	0.1(0.0)	0.1(0.0)
TYPE OF SCHOOL						
PUBLIC	*****(0.0)	*****(0.0)	0.2(0.0)	0.3(0.1)	0.2(0.1)	0.3(0.1)
PRIVATE	*****(0.0)	*****(0.0)	0.5(0.2)	0.4(0.2)	0.3(0.0)	0.8(0.5)
QUARTILES						
UPPER	0.6(0.2)	0.9(0.2)	0.9(0.2)	1.1(0.3)	0.9(0.3)	1.5(0.4)
MIDDLE TWO	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)
LOWER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)

NAEP 1990 READING TREND ASSESSMENT—AGE 17

Percentage of Students with Reading Proficiency At or Above Anchor Level 150

	1971	1975	1980	1984	1988	1990
-- TOTAL --	99.6(0.1)	99.7(0.1)	99.9(0.1)	100.0(0.0)	100.0(0.0)	99.9(0.1)
SEX						
MALE	99.4(0.1)	99.5(0.2)	99.8(0.1)	99.9(0.0)	100.0(0.0)	99.8(0.3)
FEMALE	99.8(0.1)	99.8(0.1)	99.9(0.1)	99.9(0.1)	100.0(0.0)	100.0(0.1)
ETHNICITY/RACE						
WHITE	99.9(0.0)	99.9(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)
BLACK	97.6(0.4)	97.7(0.8)	99.0(0.3)	99.9(0.1)	100.0(0.0)	99.6(0.8)
HISPANIC	*****(0.0)	99.3(0.4)	99.8(0.3)	99.8(0.2)	99.9(0.0)	99.7(0.0)
OTHER	99.6(0.7)	100.0(0.0)	99.8(0.7)	99.3(1.2)	100.0(0.0)	99.9(0.9)
REGION						
NORTHEAST	99.8(0.1)	99.7(0.2)	99.9(0.0)	100.0(0.1)	100.0(0.0)	99.9(0.0)
SOUTHEAST	99.1(0.2)	99.5(0.1)	99.8(0.1)	99.8(0.2)	100.0(0.0)	99.8(0.2)
CENTRAL	99.8(0.1)	99.8(0.1)	99.9(0.1)	100.0(0.0)	100.0(0.0)	99.9(0.3)
WEST	99.7(0.1)	99.5(0.2)	99.9(0.1)	99.9(0.0)	100.0(0.0)	99.9(0.2)
TYPE OF COMMUNITY						
EXTREME RURAL	99.4(0.3)	99.6(0.1)	99.7(0.3)	99.9(0.1)	100.0(0.0)	100.0(0.0)
DISADVANTAGED URBAN	98.9(0.3)	98.4(0.7)	99.3(0.3)	99.9(0.1)	100.0(0.0)	99.7(0.5)
ADVANTAGED URBAN	100.0(0.0)	99.9(0.1)	100.0(0.1)	100.0(0.1)	100.0(0.0)	99.8(0.0)
OTHER	99.6(0.1)	99.8(0.1)	99.9(0.0)	100.0(0.0)	100.0(0.0)	99.9(0.2)
PARENTS' EDUCATION LEVEL						
NOT GRADUATED H.S.	99.2(0.2)	99.3(0.2)	99.7(0.1)	99.9(0.1)	100.0(0.0)	99.9(0.0)
GRADUATED H.S.	99.8(0.1)	99.7(0.2)	99.8(0.1)	100.0(0.0)	100.0(0.0)	100.0(0.2)
POST H.S.	100.0(0.0)	99.9(0.1)	100.0(0.0)	100.0(0.1)	100.0(0.0)	100.0(0.1)
DO NOT KNOW	98.0(0.5)	97.7(0.9)	98.9(0.6)	99.8(0.2)	100.0(0.0)	98.5(3.0)
TYPE OF SCHOOL						
PUBLIC	*****(0.0)	*****(0.0)	99.9(0.1)	99.9(0.0)	100.0(0.0)	99.9(0.1)
PRIVATE	*****(0.0)	*****(0.0)	100.0(0.1)	100.0(0.0)	100.0(0.0)	100.0(0.0)
QUARTILES						
UPPER	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)
MIDDLE TWO	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)
LOWER	98.4(0.2)	98.6(0.4)	99.4(0.2)	99.8(0.1)	100.0(0.0)	99.5(0.6)

NAEP 1990 READING TREND ASSESSMENT—AGE 17

Percentage of Students with Reading Proficiency At or Above Anchor Level 200

	1971	1975	1980	1984	1988	1990
-- TOTAL --	96.0(0.3)	96.4(0.3)	97.2(0.3)	98.3(0.1)	98.9(0.3)	98.1(0.3)
SEX						
MALE	94.7(0.4)	95.3(0.4)	96.3(0.5)	97.6(0.2)	98.5(0.5)	97.0(0.6)
FEMALE	97.3(0.3)	97.5(0.4)	98.1(0.3)	99.0(0.1)	99.3(0.3)	99.2(0.3)
RACE/ETHNICITY						
WHITE	97.9(0.2)	98.6(0.1)	99.1(0.1)	99.0(0.1)	99.3(0.3)	98.8(0.2)
BLACK	81.9(1.5)	82.0(1.8)	85.6(1.7)	95.9(0.5)	98.0(1.0)	95.7(1.3)
HISPANIC	****(0.0)	88.7(2.4)	93.3(1.8)	95.6(0.7)	96.3(2.4)	95.9(2.1)
OTHER	95.2(1.7)	96.4(1.8)	97.9(1.5)	96.6(1.1)	98.5(1.6)	98.3(1.4)
REGION						
NORTHEAST	97.3(0.4)	97.1(0.5)	97.5(0.5)	98.6(0.3)	99.3(0.5)	98.9(0.5)
SOUTHEAST	92.2(1.0)	94.2(0.6)	95.6(1.0)	98.0(0.3)	98.6(0.5)	97.5(1.0)
CENTRAL	97.4(0.4)	97.7(0.4)	97.8(0.6)	98.7(0.2)	99.5(0.6)	98.2(0.5)
WEST	96.1(0.6)	95.9(0.9)	97.6(0.5)	98.0(0.3)	98.5(0.6)	97.8(0.8)
TYPE OF COMMUNITY						
EXTREME RURAL	94.3(1.1)	95.6(0.9)	96.0(2.3)	97.9(0.8)	99.3(0.0)	98.6(0.9)
DISADVANTAGED URBAN	89.9(1.6)	88.5(2.2)	91.0(1.6)	95.3(0.5)	98.3(2.7)	96.4(1.9)
ADVANTAGED URBAN	99.2(0.2)	99.2(0.2)	99.4(0.3)	99.0(0.3)	99.6(0.4)	98.6(0.8)
OTHER	96.3(0.3)	97.4(0.2)	97.8(0.3)	98.6(0.2)	98.8(0.4)	98.1(0.4)
PARENTS' EDUCATION LEVEL						
NOT GRADUATED H.S.	91.2(0.8)	92.3(0.8)	93.1(0.8)	96.5(0.4)	97.6(1.2)	96.3(1.8)
GRADUATED H.S.	96.7(0.3)	97.0(0.6)	97.0(0.4)	98.1(0.2)	98.8(0.4)	98.2(0.6)
POST H.S.	99.1(0.1)	99.0(0.2)	99.2(0.2)	99.3(0.1)	99.6(0.2)	99.2(0.3)
DO NOT KNOW	88.0(1.6)	79.6(2.3)	85.2(3.2)	92.8(1.4)	92.8(6.1)	84.6(4.5)
TYPE OF SCHOOL						
PUBLIC	****(0.0)	*****(0.0)	97.1(0.4)	98.1(0.1)	98.8(0.3)	98.0(0.3)
PRIVATE	****(0.0)	*****(0.0)	99.0(0.4)	99.6(0.2)	99.8(0.1)	99.6(0.6)
QUARTILES						
UPPER	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)
MIDDLE TWO	100.0(0.1)	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)	100.0(0.0)
LOWER	84.1(0.8)	85.8(1.1)	89.0(1.0)	93.2(0.5)	95.8(1.2)	92.4(1.2)

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Percentage of Students with Reading Proficiency At or Above Anchor Level 250

	1971	1975	1980	1984	1988	1990
-- TOTAL --	78.6(0.9)	80.1(0.7)	80.7(0.9)	83.1(0.5)	85.7(0.8)	84.1(1.0)
SEX						
MALE	74.4(1.0)	75.6(0.8)	77.9(1.0)	79.6(0.6)	82.9(1.4)	79.7(1.4)
FEMALE	82.6(1.0)	84.3(0.9)	83.6(1.0)	86.8(0.6)	88.2(1.1)	88.6(1.0)
RACE/ETHNICITY						
WHITE	83.7(0.7)	86.2(0.6)	86.9(0.6)	88.0(0.5)	88.7(0.9)	88.3(1.1)
BLACK	40.1(1.6)	43.0(1.6)	44.0(2.0)	65.7(1.2)	75.8(2.4)	69.1(2.8)
HISPANIC	****(0.0)	52.9(4.1)	62.2(3.1)	68.3(2.1)	71.5(4.8)	75.2(4.7)
OTHER	72.1(4.4)	70.4(4.8)	77.0(3.6)	77.8(2.6)	86.5(6.4)	83.0(4.5)
REGION						
NORTHEAST	82.4(2.0)	82.6(1.5)	80.9(1.9)	85.5(1.1)	88.5(1.9)	86.2(1.1)
SOUTHEAST	67.8(2.0)	73.1(1.3)	76.2(2.3)	80.1(1.1)	82.6(2.1)	80.8(2.0)
CENTRAL	82.8(1.4)	84.9(1.2)	82.8(1.7)	84.6(1.1)	87.3(1.7)	86.9(1.6)
WEST	78.2(1.5)	77.2(1.7)	81.9(1.3)	83.4(0.8)	84.4(1.6)	82.6(2.4)
TYPE OF COMMUNITY						
EXTREME RURAL	72.7(2.4)	77.9(2.3)	77.3(2.6)	79.5(2.7)	83.2(4.0)	83.3(2.7)
DISADVANTAGED URBAN	59.5(2.4)	58.9(3.5)	58.8(2.7)	65.5(1.8)	80.5(4.4)	71.5(3.9)
ADVANTAGED URBAN	91.1(1.2)	91.6(0.9)	89.9(1.8)	90.6(1.2)	91.7(1.8)	89.7(2.8)
OTHER	79.2(0.9)	82.1(0.8)	82.1(0.9)	84.4(0.5)	84.7(1.0)	85.0(1.2)
PARENTS' EDUCATION LEVEL						
NOT GRADUATED H.S.	60.8(1.4)	63.3(1.4)	63.4(1.8)	70.0(1.2)	68.8(3.4)	71.2(2.9)
GRADUATED H.S.	78.5(1.1)	79.3(0.9)	76.5(1.1)	79.7(0.8)	82.1(1.3)	81.3(1.6)
POST H.S.	90.0(0.6)	89.7(0.6)	89.8(0.6)	90.6(0.4)	91.7(0.9)	89.8(1.0)
DO NOT KNOW	61.4(4.3)	42.6(2.5)	51.2(3.1)	56.7(2.3)	54.0(7.3)	47.8(5.2)
TYPE OF SCHOOL						
PUBLIC	****(0.0)	*****(0.0)	79.9(1.0)	82.1(0.5)	84.6(0.8)	83.3(1.0)
PRIVATE	****(0.0)	*****(0.0)	90.3(1.8)	92.3(1.3)	92.9(1.9)	95.0(1.9)
QUARTILES						
UPPER	99.8(0.1)	100.0(0.0)	99.7(0.1)	100.0(0.0)	100.0(0.0)	100.0(0.0)
MIDDLE TWO	93.7(0.5)	96.1(0.4)	93.5(0.4)	96.9(0.2)	98.0(0.4)	97.4(0.6)
LOWER	27.1(1.0)	28.2(1.1)	36.0(1.4)	38.7(0.8)	46.6(2.7)	41.7(3.4)

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Percentage of Students with Reading Proficiency At or Above Anchor Level 300

	1971	1975	1980	1984	1988	1990
-- TOTAL --	39.0(1.0)	38.7(0.8)	37.8(1.1)	40.3(0.8)	40.9(1.5)	41.4(1.0)
SEX						
MALE	33.9(1.1)	33.7(1.0)	35.0(1.3)	35.4(0.8)	37.0(2.3)	36.1(1.5)
FEMALE	44.0(1.2)	43.6(0.9)	40.7(1.2)	45.0(0.9)	44.4(2.0)	46.8(1.3)
RACE/ETHNICITY						
WHITE	43.2(0.9)	43.9(0.8)	43.3(1.1)	46.3(0.9)	45.4(1.6)	47.5(1.2)
BLACK	7.7(0.9)	8.1(0.7)	7.1(0.8)	16.2(0.9)	24.9(3.1)	19.7(1.8)
HISPANIC	*****(0.0)	12.6(2.7)	16.5(2.1)	21.2(2.3)	23.3(3.7)	27.1(3.3)
OTHER	31.7(3.4)	28.1(4.1)	32.3(3.7)	38.3(3.3)	40.3(5.7)	40.4(6.1)
REGION						
NORTHEAST	44.3(2.6)	41.6(1.4)	38.0(2.6)	42.9(2.3)	46.9(3.1)	46.6(2.2)
SOUTHEAST	28.2(1.6)	31.8(1.4)	33.8(1.8)	36.4(1.6)	36.4(2.5)	36.9(2.7)
CENTRAL	43.2(1.9)	43.6(1.5)	39.0(2.4)	41.4(1.6)	40.2(4.2)	44.5(2.4)
WEST	37.2(1.5)	35.4(1.5)	39.6(2.2)	40.4(1.2)	40.3(2.4)	38.0(2.8)
TYPE OF COMMUNITY						
EXTREME RURAL	32.7(2.9)	35.7(2.2)	31.0(2.2)	33.5(3.1)	37.3(11.3)	40.2(3.3)
DISADVANTAGED URBAN	19.4(1.8)	19.5(2.4)	15.8(2.2)	19.1(2.1)	23.6(6.2)	25.8(4.3)
ADVANTAGED URBAN	57.2(2.2)	57.1(1.9)	53.2(2.6)	53.9(2.6)	53.3(2.9)	51.2(4.5)
OTHER	38.6(0.9)	39.6(0.9)	38.2(1.1)	40.4(0.7)	38.8(1.2)	42.1(1.2)
PARENTS' EDUCATION LEVEL						
NOT GRADUATED H.S.	19.5(1.0)	19.0(1.2)	17.0(1.3)	21.1(1.2)	17.6(3.9)	20.4(2.6)
GRADUATED H.S.	35.9(1.1)	33.2(0.8)	29.3(0.9)	31.6(0.9)	30.9(1.7)	32.3(1.6)
POST H.S.	53.4(1.1)	52.1(1.0)	50.2(1.1)	53.0(1.0)	50.8(1.9)	51.1(1.2)
DO NOT KNOW	22.6(3.3)	9.2(1.7)	12.4(2.1)	13.6(2.0)	14.5(5.7)	11.5(3.7)
TYPE OF SCHOOL						
PUBLIC	*****(0.0)	*****(0.0)	36.8(1.2)	38.7(0.7)	39.5(1.6)	39.8(1.0)
PRIVATE	*****(0.0)	*****(0.0)	49.9(3.3)	54.4(2.3)	50.4(5.7)	63.0(5.9)
QUARTILES						
UPPER	89.0(0.8)	93.1(0.5)	85.2(0.7)	90.9(0.5)	91.9(1.1)	93.6(1.4)
MIDDLE TWO	33.3(0.8)	30.8(1.0)	32.5(0.8)	34.0(0.8)	35.6(2.1)	35.8(1.3)
LOWER	0.5(0.2)	0.1(0.1)	1.1(0.3)	0.5(0.1)	0.5(0.3)	0.6(0.4)

NAEP 1990 READING TREND ASSESSMENT—AGE 17

Percentage of Students with Reading Proficiency At or Above Anchor Level 350

	1971	1975	1980	1984	1988	1990
-- TOTAL --	6.8(0.4)	6.2(0.3)	5.3(0.4)	5.7(0.3)	4.8(0.6)	7.0(0.5)
SEX						
MALE	5.2(0.4)	5.1(0.5)	4.5(0.4)	4.8(0.4)	3.5(0.9)	5.6(0.5)
FEMALE	8.4(0.5)	7.3(0.4)	6.0(0.6)	6.7(0.4)	5.5(0.8)	8.5(0.7)
RACE/ETHNICITY						
WHITE	7.7(0.4)	7.2(0.4)	6.2(0.4)	6.9(0.4)	5.5(0.7)	8.7(0.6)
BLACK	0.4(0.1)	0.4(0.3)	0.2(0.2)	0.9(0.3)	1.4(0.7)	1.5(1.0)
HISPANIC	****(0.0)	1.2(0.6)	1.3(0.4)	2.0(0.4)	1.3(1.2)	2.4(1.4)
OTHER	4.0(1.9)	3.8(3.2)	3.8(2.5)	7.0(1.2)	4.2(3.0)	6.2(2.6)
REGION						
NORTHEAST	8.7(1.1)	7.6(1.0)	5.6(0.7)	6.1(0.6)	5.6(1.6)	9.5(1.2)
SOUTHEAST	3.9(0.6)	4.5(0.5)	4.4(0.9)	5.3(0.5)	4.1(1.3)	5.8(1.1)
CENTRAL	7.8(0.8)	7.1(0.5)	5.0(0.6)	5.6(0.5)	4.4(0.7)	7.4(1.2)
WEST	6.0(0.6)	5.1(0.5)	5.8(0.7)	5.8(0.7)	4.2(0.8)	5.7(1.0)
TYPE OF COMMUNITY						
EXTREME RURAL	4.6(0.8)	5.0(0.6)	3.7(0.6)	3.7(0.6)	3.2(2.1)	7.0(1.6)
DISADVANTAGED URBAN	1.8(0.4)	1.9(0.6)	1.1(0.5)	1.7(0.5)	0.7(1.2)	3.2(2.3)
ADVANTAGED URBAN	13.1(1.1)	12.9(1.0)	8.7(0.9)	9.7(0.9)	7.4(1.7)	11.0(2.6)
OTHER	6.5(0.4)	6.1(0.4)	5.3(0.5)	5.5(0.3)	4.1(0.8)	6.9(0.6)
PARENTS' EDUCATION LEVEL						
NOT GRADUATED H.S.	1.9(0.3)	1.6(0.3)	1.0(0.3)	1.4(0.3)	1.0(0.7)	1.8(0.8)
GRADUATED H.S.	4.9(0.4)	3.8(0.4)	2.6(0.2)	2.9(0.3)	1.8(0.7)	3.9(0.7)
POST H.S.	11.3(0.6)	10.1(0.6)	8.3(0.6)	8.9(0.5)	6.7(1.0)	9.8(0.7)
DO NOT KNOW	2.6(0.4)	0.3(0.0)	1.1(1.1)	0.6(0.3)	0.2(0.0)	0.3(0.5)
TYPE OF SCHOOL						
PUBLIC	*****(0.0)	*****(0.0)	5.1(0.4)	5.3(0.3)	4.4(0.6)	6.5(0.5)
PRIVATE	*****(0.0)	*****(0.0)	7.7(1.3)	9.2(1.0)	5.6(2.4)	13.7(2.7)
QUARTILES						
UPPER	24.9(0.9)	24.5(0.9)	18.7(1.0)	21.7(1.1)	17.6(2.1)	26.9(1.6)
MIDDLE TWO	1.2(0.2)	0.2(0.1)	1.2(0.2)	0.5(0.1)	0.3(0.2)	0.6(0.3)
LOWER	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)	0.0(0.0)

NAEP 1990 READING TREND ASSESSMENT—AGE 9

Mean Proficiencies, Standard Deviations, and Percentiles

	1971	1975	1980	1984	1988	1990
TOTAL SAMPLE						
MEAN	207.6 (1.0)	210.0 (0.7)	215.0 (1.0)	211.0 (0.9)	211.8 (1.1)	209.2 (1.2)
ST. DEV.	42.1 (0.4)	38.6 (0.3)	37.9 (0.4)	41.1 (0.4)	41.2 (1.0)	44.7 (0.8)
PERCENTILES						
5	134.8 (2.0)	143.2 (1.3)	148.5 (1.6)	140.5 (1.2)	141.9 (3.6)	134.8 (3.2)
10	151.6 (1.6)	159.2 (1.1)	165.1 (1.4)	156.7 (1.2)	156.7 (2.1)	150.1 (1.9)
25	180.0 (1.3)	185.2 (0.8)	191.1 (1.2)	183.7 (1.2)	184.3 (1.8)	178.7 (1.8)
50	209.3 (1.0)	211.9 (0.8)	217.2 (0.9)	212.6 (1.0)	213.7 (1.4)	210.3 (1.5)
75	236.7 (1.0)	236.5 (0.9)	241.3 (1.0)	239.6 (0.9)	240.1 (1.3)	240.3 (1.8)
90	260.5 (0.8)	258.1 (0.8)	261.7 (1.1)	262.8 (0.9)	263.0 (1.7)	265.7 (1.8)
95	274.1 (0.9)	270.6 (1.1)	273.3 (1.6)	276.5 (1.4)	277.5 (2.0)	280.4 (1.3)
MALE STUDENTS						
MEAN	201.2 (1.1)	204.3 (0.8)	210.0 (1.1)	207.5 (1.0)	207.5 (1.4)	204.0 (1.7)
ST. DEV.	42.1 (0.5)	39.0 (0.5)	38.7 (0.5)	42.3 (0.5)	42.7 (1.2)	45.1 (1.0)
PERCENTILES						
5	128.9 (2.0)	136.6 (1.1)	141.9 (2.3)	136.0 (1.1)	136.5 (2.9)	129.6 (5.8)
10	145.0 (1.7)	152.6 (1.3)	158.7 (1.4)	151.1 (1.5)	151.1 (2.4)	145.1 (1.9)
25	173.6 (1.4)	178.9 (1.0)	185.3 (1.4)	178.5 (1.1)	178.4 (1.8)	172.2 (2.8)
50	202.8 (1.2)	206.1 (0.9)	212.5 (1.2)	209.1 (1.3)	209.7 (1.8)	204.4 (2.2)
75	230.4 (1.1)	231.4 (1.0)	237.1 (1.1)	237.7 (1.2)	237.1 (1.9)	236.1 (1.9)
90	254.6 (1.2)	253.0 (1.1)	257.5 (0.8)	261.1 (1.1)	260.3 (2.0)	261.7 (2.6)
95	268.4 (1.5)	265.4 (1.4)	268.7 (1.1)	275.1 (1.1)	275.1 (2.3)	276.1 (5.6)
FEMALE STUDENTS						
MEAN	213.9 (1.0)	215.8 (0.8)	220.1 (1.1)	214.4 (0.9)	216.3 (1.3)	214.5 (1.2)
ST. DEV.	41.0 (0.6)	37.3 (0.4)	36.5 (0.5)	39.6 (0.5)	39.2 (1.2)	43.6 (1.3)
PERCENTILES						
5	142.9 (2.1)	151.3 (1.4)	157.1 (1.8)	146.4 (2.1)	149.3 (5.5)	140.6 (3.9)
10	159.5 (1.3)	167.1 (1.1)	172.5 (1.7)	162.9 (1.6)	164.3 (4.6)	156.8 (3.2)
25	186.7 (1.2)	192.0 (1.0)	197.2 (1.2)	188.7 (1.0)	190.6 (2.4)	185.7 (1.7)
50	215.6 (1.1)	217.2 (0.9)	221.7 (1.1)	215.7 (1.0)	217.5 (2.0)	215.9 (1.3)
75	242.4 (1.1)	241.1 (1.0)	245.2 (1.1)	241.6 (1.0)	242.6 (1.1)	244.4 (1.9)
90	265.0 (0.9)	262.3 (1.0)	265.5 (1.7)	264.4 (1.3)	265.3 (2.2)	269.4 (1.9)
95	278.6 (1.5)	274.8 (1.1)	277.0 (1.5)	277.8 (2.0)	279.1 (3.4)	284.1 (2.1)
WHITE STUDENTS						
MEAN	214.0 (0.9)	216.6 (0.7)	221.3 (0.8)	218.2 (0.9)	217.7 (1.4)	217.0 (1.3)
ST. DEV.	39.4 (0.4)	36.1 (0.3)	35.2 (0.3)	38.8 (0.3)	39.3 (1.0)	42.9 (1.0)
PERCENTILES						
5	146.3 (2.4)	154.4 (1.2)	160.7 (1.5)	152.0 (1.3)	150.2 (3.4)	144.2 (3.2)
10	162.4 (1.3)	169.8 (1.1)	175.3 (1.0)	167.1 (1.0)	165.0 (3.9)	160.0 (1.5)
25	188.1 (1.2)	193.3 (0.7)	199.0 (0.9)	192.4 (1.0)	191.8 (2.4)	188.0 (2.8)
50	215.2 (0.9)	217.9 (0.7)	222.8 (0.8)	219.5 (1.0)	219.1 (1.2)	218.4 (2.1)
75	241.0 (0.9)	241.0 (0.9)	245.7 (0.9)	244.9 (0.9)	244.3 (1.8)	246.7 (2.3)
90	263.6 (0.8)	261.6 (1.0)	265.1 (1.1)	267.2 (1.3)	266.7 (2.2)	270.9 (2.1)
95	276.7 (0.9)	273.8 (1.3)	276.4 (1.2)	280.2 (1.3)	280.6 (2.6)	285.3 (2.6)
BLACK STUDENTS						
MEAN	170.1 (1.7)	181.2 (1.2)	189.3 (1.8)	185.7 (1.4)	188.5 (2.4)	181.8 (2.9)
ST. DEV.	38.3 (0.7)	35.8 (0.6)	37.6 (1.0)	38.9 (0.9)	39.4 (1.6)	41.7 (1.7)
PERCENTILES						
5	106.7 (2.5)	118.8 (2.3)	123.1 (4.1)	120.8 (2.2)	124.7 (6.3)	115.0 (4.7)
10	120.0 (2.0)	133.7 (2.8)	139.4 (4.0)	135.1 (2.8)	138.3 (3.4)	128.9 (3.9)
25	143.4 (2.0)	157.5 (2.3)	165.3 (1.9)	159.3 (1.8)	161.8 (3.0)	152.5 (3.2)
50	171.0 (2.1)	182.8 (1.2)	191.7 (2.1)	186.5 (1.5)	188.3 (4.0)	181.8 (3.1)
75	196.3 (1.8)	206.5 (1.2)	215.6 (1.9)	212.5 (1.6)	216.5 (2.9)	210.5 (2.4)
90	218.9 (1.6)	226.3 (1.5)	236.3 (1.9)	235.3 (2.5)	238.2 (3.8)	236.3 (2.7)
95	232.4 (1.7)	237.2 (2.0)	247.1 (1.8)	248.4 (2.0)	252.2 (4.6)	250.7 (6.9)
HISPANIC STUDENTS (No data were available for Hispanic students in 1971.)						
MEAN	0.0 (0.0)	182.7 (2.2)	190.2 (2.3)	187.1 (3.1)	193.7 (3.5)	189.4 (2.3)
ST. DEV.	0.0 (0.0)	36.8 (1.3)	38.2 (1.2)	39.2 (1.5)	41.5 (2.8)	39.7 (1.6)
PERCENTILES						
5	0.0 (0.0)	120.3 (4.9)	123.4 (3.1)	120.3 (5.1)	121.8 (11.3)	125.4 (8.9)
10	0.0 (0.0)	133.4 (5.2)	138.4 (4.1)	134.7 (7.2)	140.3 (7.7)	139.0 (4.3)
25	0.0 (0.0)	157.4 (3.0)	164.3 (3.9)	160.7 (2.4)	164.9 (5.1)	160.8 (1.9)
50	0.0 (0.0)	184.2 (2.9)	192.0 (3.3)	189.2 (2.3)	196.0 (3.4)	189.3 (3.5)
75	0.0 (0.0)	209.4 (3.4)	217.6 (3.0)	215.4 (2.3)	222.0 (6.0)	218.9 (4.0)
90	0.0 (0.0)	228.6 (3.6)	237.8 (2.7)	236.1 (2.2)	246.7 (8.0)	239.3 (5.7)
95	0.0 (0.0)	240.3 (2.6)	249.9 (4.3)	247.1 (2.1)	258.6 (11.4)	253.2 (6.7)

NAEP 1990 READING TREND ASSESSMENT—AGE 13

Mean Proficiencies, Standard Deviations, and Percentiles

	1971	1975	1980	1984	1988	1990
TOTAL SAMPLE						
MEAN	255.2 (0.9)	255.9 (0.8)	258.5 (0.9)	257.1 (0.6)	257.5 (1.0)	256.8 (0.8)
ST. DEV.	35.7 (0.4)	35.8 (0.3)	34.9 (0.4)	35.5 (0.3)	34.7 (0.5)	36.0 (0.6)
PERCENTILES						
5	192.8 (1.8)	193.5 (1.1)	199.1 (1.9)	196.7 (1.1)	199.5 (1.7)	195.7 (1.9)
10	207.8 (1.4)	208.7 (1.0)	212.8 (1.5)	210.2 (0.9)	212.9 (1.2)	209.8 (1.8)
25	232.3 (1.2)	232.9 (1.0)	235.3 (1.1)	233.9 (0.8)	234.2 (1.2)	233.2 (1.0)
50	257.0 (1.0)	257.7 (0.9)	259.6 (0.8)	258.2 (0.8)	257.9 (1.1)	257.3 (0.9)
75	279.9 (0.8)	280.6 (0.8)	282.8 (0.8)	281.6 (0.6)	281.4 (1.4)	281.5 (0.8)
90	299.6 (0.9)	300.5 (1.0)	302.3 (0.8)	301.7 (0.8)	301.6 (1.0)	302.0 (1.0)
95	310.8 (0.9)	311.8 (1.0)	313.9 (0.8)	313.7 (1.0)	313.7 (1.3)	314.4 (1.3)
MALE STUDENTS						
MEAN	249.6 (1.0)	249.6 (0.8)	254.3 (1.1)	252.7 (0.7)	251.8 (1.3)	250.5 (1.1)
ST. DEV.	35.9 (0.5)	35.7 (0.4)	35.0 (0.5)	35.8 (0.4)	35.3 (0.7)	36.0 (0.7)
PERCENTILES						
5	186.7 (1.6)	187.2 (1.1)	194.9 (1.9)	191.9 (1.0)	192.6 (2.5)	189.7 (2.2)
10	201.6 (1.6)	202.3 (1.5)	208.5 (1.5)	205.5 (1.2)	206.7 (1.8)	202.8 (1.4)
25	226.3 (1.2)	226.8 (1.1)	230.8 (1.2)	228.9 (1.1)	227.7 (2.1)	226.9 (1.9)
50	251.4 (0.8)	251.4 (0.9)	255.4 (1.1)	253.9 (0.9)	252.1 (2.1)	251.9 (1.3)
75	274.5 (0.8)	274.1 (0.8)	278.6 (1.2)	277.5 (1.0)	276.5 (2.0)	275.3 (1.2)
90	294.2 (1.0)	293.5 (1.0)	298.5 (1.2)	297.8 (1.0)	297.2 (1.5)	295.3 (1.2)
95	305.9 (1.3)	305.6 (1.7)	309.9 (0.9)	309.4 (1.2)	309.4 (2.8)	307.4 (3.2)
FEMALE STUDENTS						
MEAN	260.8 (0.9)	262.3 (0.9)	262.6 (0.9)	261.8 (0.7)	263.0 (1.0)	263.1 (1.1)
ST. DEV.	34.5 (0.4)	34.8 (0.4)	34.2 (0.4)	34.5 (0.3)	33.1 (0.6)	34.8 (0.7)
PERCENTILES						
5	200.9 (1.5)	202.1 (1.7)	204.2 (2.0)	203.0 (1.3)	207.3 (3.9)	205.3 (3.1)
10	215.2 (1.4)	215.9 (1.4)	218.0 (2.0)	216.8 (1.1)	221.0 (1.6)	217.9 (2.0)
25	238.5 (0.8)	239.8 (1.1)	240.0 (1.1)	239.1 (0.8)	240.0 (1.6)	240.0 (1.9)
50	262.4 (1.1)	264.2 (1.0)	263.4 (0.9)	262.7 (0.8)	263.0 (1.4)	263.0 (1.6)
75	285.0 (1.0)	286.6 (1.2)	286.3 (1.0)	285.4 (0.7)	285.8 (1.0)	286.6 (1.1)
90	303.8 (1.3)	305.4 (1.0)	305.6 (1.0)	305.5 (0.8)	305.2 (1.2)	308.1 (1.5)
95	314.6 (0.9)	316.1 (1.1)	317.3 (1.8)	317.5 (1.6)	317.7 (3.2)	319.4 (2.5)
WHITE STUDENTS						
MEAN	260.9 (0.7)	262.1 (0.7)	264.4 (0.7)	262.5 (0.6)	261.3 (1.1)	262.3 (0.9)
ST. DEV.	32.9 (0.3)	32.9 (0.3)	32.7 (0.3)	33.8 (0.4)	33.9 (0.5)	34.5 (0.6)
PERCENTILES						
5	204.6 (1.2)	206.3 (1.0)	209.0 (1.2)	204.9 (0.9)	204.0 (1.4)	204.1 (2.2)
10	217.9 (0.9)	219.2 (0.7)	221.8 (1.2)	218.3 (0.8)	217.1 (2.1)	217.3 (1.7)
25	239.4 (0.9)	240.7 (0.8)	242.8 (0.8)	240.6 (0.8)	238.3 (1.0)	239.6 (1.7)
50	262.0 (0.8)	263.1 (1.0)	265.1 (0.6)	263.4 (0.7)	262.2 (1.1)	262.6 (1.4)
75	283.5 (0.9)	284.6 (0.8)	286.9 (0.7)	285.6 (0.7)	285.1 (0.9)	285.6 (1.2)
90	302.2 (0.7)	303.5 (0.9)	305.7 (0.8)	305.0 (0.8)	304.2 (1.5)	306.0 (2.4)
95	313.1 (1.1)	314.3 (0.9)	316.9 (0.8)	316.8 (1.3)	315.8 (1.1)	318.1 (2.7)
BLACK STUDENTS						
MEAN	222.4 (1.2)	225.7 (1.2)	232.8 (1.5)	236.3 (1.2)	242.9 (2.4)	241.5 (2.2)
ST. DEV.	33.5 (0.5)	34.9 (0.7)	32.7 (0.8)	34.1 (0.8)	32.1 (1.3)	35.3 (1.5)
PERCENTILES						
5	166.3 (1.5)	167.2 (2.5)	178.6 (2.4)	180.1 (2.0)	190.6 (3.4)	182.3 (5.3)
10	178.0 (2.2)	180.1 (2.5)	190.6 (3.3)	192.4 (1.9)	202.2 (3.3)	194.3 (7.3)
25	199.1 (1.9)	202.2 (1.3)	210.9 (1.8)	213.3 (2.6)	222.0 (2.4)	217.0 (3.2)
50	223.3 (1.4)	226.0 (1.7)	232.6 (1.3)	236.4 (1.3)	242.4 (2.7)	242.5 (4.0)
75	245.5 (1.4)	249.9 (1.5)	254.8 (1.9)	259.3 (1.1)	263.6 (4.5)	265.7 (2.5)
90	264.8 (1.3)	270.6 (1.2)	275.0 (1.7)	280.3 (1.9)	283.6 (4.7)	285.9 (4.9)
95	276.8 (2.3)	282.7 (2.3)	286.2 (1.5)	292.7 (1.6)	298.9 (2.2)	298.9 (3.0)
HISPANIC STUDENTS (No data were available for Hispanic students in 1971).						
MEAN	0.0 (0.0)	232.5 (3.0)	237.2 (2.0)	239.6 (2.0)	240.1 (3.5)	237.8 (2.3)
ST. DEV.	0.0 (0.0)	34.5 (1.0)	32.7 (0.8)	34.9 (1.2)	34.6 (2.4)	35.9 (1.3)
PERCENTILES						
5	0.0 (0.0)	173.7 (6.9)	182.6 (4.8)	180.8 (2.9)	181.4 (6.9)	178.0 (9.6)
10	0.0 (0.0)	186.7 (2.8)	194.9 (4.5)	193.3 (3.3)	194.6 (3.8)	191.3 (4.9)
25	0.0 (0.0)	207.8 (3.0)	214.8 (3.0)	216.1 (2.5)	218.9 (6.1)	214.1 (4.1)
50	0.0 (0.0)	233.5 (3.6)	237.5 (2.4)	240.4 (2.5)	240.3 (4.1)	238.6 (4.1)
75	0.0 (0.0)	256.7 (4.8)	259.3 (1.9)	263.5 (2.3)	262.0 (5.4)	262.2 (3.1)
90	0.0 (0.0)	277.2 (2.3)	279.2 (2.9)	284.2 (2.2)	284.0 (8.7)	283.8 (6.0)
95	0.0 (0.0)	289.1 (3.5)	290.5 (1.5)	295.9 (3.1)	297.3 (10.1)	295.9 (4.5)

NAEP 1990 READING TREND ASSESSMENT—AGE 17

Mean Proficiencies, Standard Deviations, and Percentiles

	1971	1975	1980	1984	1988	1990
TOTAL SAMPLE						
MEAN	285.2 (1.2)	285.6 (0.8)	285.5 (1.2)	288.8 (0.8)	290.1 (1.0)	290.2 (1.1)
ST. DEV.	45.8 (0.5)	44.0 (0.6)	41.8 (0.6)	40.3 (0.3)	37.1 (0.7)	41.3 (0.7)
PERCENTILES						
5	206.1 (1.5)	209.3 (3.0)	213.0 (1.7)	219.9 (1.3)	226.1 (1.3)	220.0 (2.3)
10	225.3 (1.7)	228.4 (1.7)	230.6 (1.8)	236.0 (0.9)	241.5 (2.2)	236.9 (3.1)
25	255.9 (1.6)	257.8 (1.1)	258.7 (1.2)	262.5 (1.1)	265.7 (1.8)	263.5 (1.3)
50	287.7 (1.4)	287.9 (0.7)	287.5 (1.4)	290.3 (0.9)	291.1 (1.9)	291.1 (1.3)
75	316.7 (1.0)	315.7 (0.7)	314.6 (1.2)	316.8 (0.9)	316.0 (1.4)	318.6 (1.5)
90	341.7 (1.1)	340.0 (0.9)	337.5 (1.4)	339.6 (0.7)	336.9 (2.1)	342.7 (2.1)
95	356.5 (1.5)	354.3 (0.7)	350.9 (1.3)	352.6 (1.0)	348.7 (1.8)	356.0 (1.7)
MALE STUDENTS						
MEAN	278.9 (1.2)	279.7 (1.0)	281.8 (1.3)	283.9 (0.8)	286.0 (1.5)	284.0 (1.6)
ST. DEV.	46.3 (0.6)	45.1 (0.6)	42.7 (0.6)	40.9 (0.4)	37.5 (1.2)	42.6 (0.8)
PERCENTILES						
5	198.3 (1.6)	201.6 (1.4)	207.2 (1.9)	214.3 (1.5)	222.0 (2.3)	209.4 (3.2)
10	218.2 (2.0)	220.8 (2.0)	225.4 (2.2)	230.1 (1.0)	236.3 (3.7)	228.2 (3.4)
25	249.1 (1.4)	250.9 (1.1)	254.4 (1.5)	257.0 (1.3)	261.6 (1.8)	257.3 (1.9)
50	281.6 (1.4)	282.0 (1.3)	284.1 (1.2)	285.4 (0.8)	287.0 (2.3)	285.9 (2.1)
75	310.9 (1.2)	310.8 (1.0)	311.9 (1.2)	312.3 (1.0)	312.0 (3.4)	313.2 (2.1)
90	336.1 (2.0)	335.9 (1.4)	335.2 (1.3)	335.3 (1.2)	333.4 (2.1)	338.4 (2.3)
95	350.8 (1.7)	350.3 (1.9)	348.3 (1.2)	348.8 (1.6)	345.6 (4.2)	351.9 (1.6)
FEMALE STUDENTS						
MEAN	291.3 (1.3)	291.2 (1.0)	289.2 (1.2)	294.0 (0.9)	293.8 (1.5)	296.5 (1.2)
ST. DEV.	44.5 (0.6)	42.2 (0.8)	40.5 (0.7)	39.0 (0.4)	36.3 (0.9)	38.8 (0.8)
PERCENTILES						
5	215.0 (1.9)	218.9 (2.7)	219.4 (2.1)	227.4 (1.9)	231.7 (3.3)	232.3 (3.8)
10	233.3 (1.6)	236.8 (2.0)	236.8 (1.6)	242.9 (1.2)	246.5 (4.8)	247.0 (2.1)
25	262.7 (1.7)	264.9 (1.4)	262.9 (1.8)	268.6 (1.3)	270.2 (2.1)	270.5 (2.3)
50	293.6 (1.2)	293.4 (0.9)	290.7 (1.1)	295.2 (1.0)	294.6 (2.2)	296.6 (1.2)
75	321.7 (1.6)	319.7 (0.7)	317.0 (1.6)	320.9 (0.9)	319.4 (1.5)	323.5 (1.5)
90	346.2 (1.6)	343.3 (1.0)	339.7 (1.7)	343.1 (1.0)	339.8 (1.7)	346.3 (2.5)
95	360.7 (1.2)	357.0 (1.3)	353.2 (1.8)	355.5 (1.2)	351.7 (2.8)	359.4 (2.7)
WHITE STUDENTS						
MEAN	291.4 (1.0)	293.0 (0.6)	292.8 (0.9)	295.3 (0.9)	294.7 (1.2)	296.6 (1.2)
ST. DEV.	42.5 (0.4)	39.8 (0.4)	37.9 (0.4)	38.2 (0.3)	36.0 (0.8)	39.6 (0.6)
PERCENTILES						
5	219.4 (1.4)	225.9 (1.2)	228.5 (1.4)	229.9 (1.4)	232.6 (1.1)	228.5 (2.5)
10	236.6 (1.0)	241.7 (0.9)	243.5 (1.5)	245.6 (0.9)	247.3 (3.7)	246.2 (2.5)
25	263.9 (1.4)	267.0 (0.9)	267.7 (1.0)	270.7 (1.1)	271.4 (1.7)	271.1 (1.4)
50	292.9 (1.2)	294.0 (0.8)	293.6 (0.8)	296.7 (1.1)	295.4 (1.6)	297.5 (1.2)
75	320.1 (1.1)	319.9 (0.7)	318.8 (1.0)	321.6 (0.8)	319.9 (1.9)	323.8 (1.9)
90	344.5 (1.0)	343.2 (0.7)	340.6 (1.3)	343.2 (0.8)	339.7 (1.6)	347.1 (1.6)
95	358.9 (1.4)	357.0 (1.2)	353.5 (1.4)	355.8 (0.9)	351.6 (3.0)	359.7 (1.7)
BLACK STUDENTS						
MEAN	238.7 (1.7)	240.6 (2.0)	243.1 (1.8)	263.6 (1.2)	274.4 (2.4)	267.3 (2.3)
ST. DEV.	43.5 (0.7)	43.8 (1.2)	39.5 (1.2)	37.0 (0.8)	35.9 (1.3)	39.2 (2.2)
PERCENTILES						
5	164.7 (4.4)	164.7 (3.1)	176.0 (2.4)	201.9 (4.1)	214.4 (9.6)	201.3 (7.9)
10	182.1 (4.2)	182.4 (5.3)	191.1 (3.6)	216.0 (2.0)	227.8 (4.3)	217.4 (4.0)
25	210.4 (2.4)	212.1 (3.0)	217.0 (2.7)	239.0 (1.4)	250.5 (2.5)	242.4 (3.9)
50	239.3 (1.6)	242.1 (1.6)	243.9 (2.6)	264.2 (1.2)	274.3 (3.6)	268.4 (1.9)
75	268.1 (2.0)	271.6 (1.4)	270.1 (2.0)	288.3 (1.6)	299.6 (3.1)	293.7 (2.7)
90	294.1 (2.4)	295.7 (1.4)	293.3 (1.7)	310.5 (1.9)	321.0 (4.0)	316.2 (4.8)
95	309.7 (2.2)	308.3 (2.7)	306.6 (2.4)	323.6 (3.4)	333.1 (4.9)	330.5 (11.0)
HISPANIC STUDENTS (No data were available for Hispanic students in 1971).						
MEAN	0.0 (0.0)	252.4 (3.6)	261.4 (2.7)	268.1 (2.9)	270.8 (4.3)	274.8 (3.6)
ST. DEV.	0.0 (0.0)	42.0 (2.2)	40.1 (1.4)	39.7 (1.5)	37.7 (2.0)	40.7 (2.7)
PERCENTILES						
5	0.0 (0.0)	184.4 (3.7)	194.3 (7.8)	201.5 (2.4)	204.2 (11.7)	205.9 (11.1)
10	0.0 (0.0)	197.1 (4.9)	208.2 (3.7)	216.6 (2.9)	218.0 (7.4)	224.3 (12.0)
25	0.0 (0.0)	225.4 (5.9)	235.3 (5.0)	241.5 (2.6)	246.4 (5.9)	250.4 (8.3)
50	0.0 (0.0)	252.8 (3.7)	262.6 (3.5)	268.6 (3.1)	273.6 (5.1)	276.3 (3.2)
75	0.0 (0.0)	279.4 (3.0)	288.6 (3.2)	295.4 (3.9)	297.9 (7.1)	302.6 (4.9)
90	0.0 (0.0)	306.7 (6.1)	312.6 (3.0)	318.3 (6.1)	315.9 (18.1)	326.5 (3.2)
95	0.0 (0.0)	320.8 (6.8)	325.1 (3.4)	332.3 (7.7)	328.0 (8.6)	339.4 (11.2)

NAEP 1990 READING TREND ASSESSMENT—AGE 9

Percentage of Students Responding Correctly to Reading Trend Items

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
FIND PICTURE FACT	1990	46.8(1.8)	52.3(3.0)	41.4(2.5)	44.2(2.1)	54.6(4.2)	54.0(7.4)
	1988	43.1(1.9)	54.6(3.0)	30.1(2.6)	41.3(2.3)	57.0(4.8)	37.5(5.6)
	1984	57.2(1.1)	65.5(1.4)	47.9(1.7)	56.5(1.2)	62.8(3.1)	52.0(5.6)
INSECT COMMUNICATION FACT	1990	69.2(2.3)	67.4(3.4)	71.0(2.7)	73.3(2.4)	51.8(6.5)	63.2(5.9)
	1988	67.5(2.5)	68.6(3.4)	66.3(3.0)	70.7(2.9)	53.8(5.4)	56.0(6.2)
	1984	65.4(1.4)	63.0(1.8)	68.0(1.8)	69.5(1.5)	49.5(3.2)	50.0(7.3)
INSECT GENDER FACT	1990	55.6(2.1)	50.4(2.8)	60.7(2.9)	60.3(2.6)	37.9(5.0)	48.5(7.9)
	1988	57.4(2.3)	56.0(2.6)	59.0(3.0)	58.3(2.6)	53.5(6.0)	50.1(4.7)
	1984	56.2(1.4)	54.0(2.1)	58.8(1.8)	58.3(1.4)	47.4(3.7)	51.6(7.5)
INSECT ANATOMY	1990	65.9(2.5)	63.7(3.2)	68.2(2.9)	68.8(3.3)	56.0(5.1)	58.2(5.3)
	1988	66.7(2.3)	66.2(3.3)	67.4(2.8)	68.5(2.7)	55.0(3.4)	66.9(3.7)
	1984	62.5(1.1)	58.5(1.6)	67.0(1.5)	65.3(1.2)	53.0(3.6)	45.1(6.5)
DOG PICTURE: BEST DESCRIPTION	1990	94.3(1.0)	93.6(1.4)	95.1(1.4)	95.3(1.0)	89.0(3.5)	95.2(2.5)
	1988	95.0(1.2)	95.8(1.2)	94.0(1.8)	95.2(1.4)	94.1(2.4)	93.4(3.6)
	1984	93.9(0.6)	93.2(0.7)	94.7(0.8)	94.9(0.6)	90.8(1.8)	88.5(3.8)
NUT STORY: PLAN	1990	79.8(1.7)	79.6(2.7)	80.1(2.1)	85.0(1.7)	62.3(5.1)	71.5(5.6)
	1988	83.3(1.6)	80.2(2.1)	86.8(2.1)	85.6(1.9)	75.3(4.6)	74.0(4.6)
	1984	79.2(1.1)	75.0(1.6)	83.8(1.4)	82.2(1.3)	68.1(3.3)	68.6(4.7)
NUT STORY: PROBLEM	1990	51.1(2.2)	49.1(2.9)	53.0(2.6)	56.8(2.6)	29.0(4.4)	40.1(6.4)
	1988	54.4(2.4)	52.8(3.2)	56.3(3.1)	58.1(2.8)	34.0(4.5)	50.8(7.7)
	1984	51.7(1.3)	52.2(1.6)	51.1(2.0)	56.7(1.5)	29.8(3.1)	38.0(4.7)
NUT STORY: GOAL	1990	68.2(2.4)	65.6(2.9)	70.7(2.8)	72.3(2.6)	54.6(5.3)	60.2(5.4)
	1988	70.4(2.1)	67.0(3.1)	74.3(2.4)	73.2(2.4)	62.8(7.9)	50.0(5.6)
	1984	67.1(1.1)	64.3(1.6)	70.2(1.4)	69.4(1.5)	57.5(3.5)	57.7(6.5)
NUT STORY: OUTCOME	1990	58.1(2.4)	57.5(3.2)	58.8(2.8)	63.9(2.5)	37.8(5.6)	48.5(6.5)
	1988	60.9(2.2)	58.9(3.3)	63.3(2.4)	66.2(2.4)	37.0(4.0)	43.3(9.4)
	1984	58.7(1.3)	57.1(1.6)	60.5(2.0)	62.8(1.7)	44.5(3.5)	42.8(4.3)
HISTORY: DEFINITION	1990	54.9(1.7)	50.8(2.1)	59.4(2.5)	62.1(2.0)	25.7(6.0)	39.2(6.5)
	1988	57.7(3.1)	52.6(4.2)	62.5(3.9)	63.1(3.6)	39.1(5.0)	35.4(9.9)
	1984	56.7(1.4)	53.6(1.9)	59.9(1.8)	62.8(1.8)	37.1(2.3)	37.2(3.9)
HISTORY: SURVIVAL	1990	45.1(1.9)	46.0(2.7)	44.2(2.9)	48.6(2.0)	31.4(5.4)	34.1(6.4)
	1988	46.3(2.1)	46.7(3.8)	46.0(3.0)	48.8(2.7)	32.1(3.8)	38.8(5.5)
	1984	50.3(1.6)	50.9(1.8)	49.7(1.9)	53.1(1.9)	38.9(2.4)	42.8(3.6)
HISTORY: LOCATION	1990	36.8(1.8)	35.2(2.6)	38.6(3.1)	38.5(2.4)	29.3(3.7)	38.2(5.9)
	1988	36.6(2.6)	36.3(3.7)	36.9(2.8)	37.6(2.6)	27.3(6.7)	41.3(8.3)
	1984	39.2(1.3)	40.6(1.8)	37.7(1.2)	40.8(1.4)	32.2(2.2)	35.7(7.6)
HISTORY: MAIN PURPOSE	1990	36.0(1.8)	35.7(2.7)	36.3(2.6)	38.2(2.[illegible])	27.4(5.4)	24.7(5.5)
	1988	38.0(2.4)	36.6(3.1)	39.3(2.8)	38.7(3.0)	28.8(3.9)	36.0(5.9)
	1984	32.1(1.1)	31.0(1.9)	33.3(1.4)	34.0(1.4)	23.4(1.6)	27.9(5.2)
REASON FOR YVONNE'S DILEMMA	1990	82.2(1.5)	79.5(2.2)	85.0(2.2)	84.7(1.6)	69.4(4.8)	77.8(4.1)
	1988	82.4(1.9)	78.9(2.7)	85.6(2.7)	84.6(2.5)	73.9(4.1)	70.4(6.9)
	1984	83.3(1.0)	79.0(1.4)	87.7(1.0)	86.8(1.2)	72.0(2.3)	69.4(4.7)
FLY STORY: PROBLEM	1990	9.0(1.1)	8.9(1.4)	9.1(1.6)	8.9(1.3)	10.0(2.6)	6.3(3.4)
	1988	10.9(1.5)	8.4(2.2)	13.3(2.1)	12.2(1.9)	9.2(2.2)	6.3(3.4)
	1984	9.6(0.7)	10.6(1.0)	8.6(0.9)	9.4(0.7)	7.5(1.6)	12.8(2.0)
FLY STORY: RESOLUTION	1990	19.1(1.7)	17.1(2.2)	21.2(2.4)	20.2(1.9)	18.1(4.8)	10.2(4.7)
	1988	16.1(1.4)	16.0(2.3)	16.2(2.0)	16.2(1.7)	18.8(2.1)	10.6(4.3)
	1984	15.3(1.0)	16.4(1.3)	14.1(1.3)	14.8(1.0)	15.2(2.1)	15.2(3.0)

NAEP 1990 READING TREND ASSESSMENT—AGE 9

Percentage of Students Responding Correctly to Reading Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
DOG POEM: MAIN IDEA	1990	65.3(2.0)	60.9(2.9)	69.9(2.7)	72.0(2.2)	38.9(5.5)	57.2(6.4)
	1988	69.5(2.3)	65.4(3.8)	73.3(2.2)	73.7(2.9)	50.1(4.2)	54.7(8.3)
	1984	67.8(1.3)	62.5(2.0)	73.4(1.3)	73.6(1.6)	46.8(3.2)	50.8(3.4)
DOG POEM: RESOLUTION	1990	67.1(2.3)	64.1(2.7)	70.4(3.6)	74.8(2.1)	38.2(5.9)	47.5(8.0)
	1988	68.4(2.8)	64.2(4.2)	72.3(3.1)	72.8(3.0)	53.1(4.7)	53.2(7.5)
	1984	69.7(1.2)	65.4(1.6)	74.1(1.3)	73.9(1.3)	53.8(2.8)	58.5(3.6)
FLYING: 1ST MACHINE	1990	29.3(1.9)	28.5(2.4)	30.1(2.4)	33.5(2.4)	15.8(3.3)	12.3(4.6)
	1988	29.9(1.7)	29.2(2.1)	30.5(2.9)	33.0(2.3)	17.5(4.1)	25.2(4.8)
	1984	29.3(1.3)	29.9(1.6)	28.6(1.6)	32.3(1.6)	15.1(1.7)	23.4(5.0)
FLYING: TYPES OF PLANES	1990	35.9(2.4)	32.0(2.3)	40.2(3.9)	38.6(2.6)	21.9(5.0)	40.2(6.1)
	1988	39.1(2.4)	37.9(2.7)	40.2(3.3)	41.1(2.8)	29.6(4.2)	34.3(8.4)
	1984	36.2(1.2)	37.3(1.7)	35.2(1.5)	39.5(1.5)	21.2(3.2)	30.9(4.0)
FLYING: DIFFERENCES	1990	43.3(2.2)	44.0(2.8)	42.4(3.1)	48.2(2.4)	24.2(4.8)	36.1(6.2)
	1988	45.3(2.0)	44.5(3.8)	46.0(3.0)	49.0(2.4)	30.9(4.5)	33.4(5.7)
	1984	40.5(1.5)	42.1(2.0)	39.0(1.5)	44.7(1.5)	21.7(2.2)	28.9(6.3)
FOLKS STORY: INFERRING DETAIL	1990	38.9(2.2)	36.3(2.6)	41.7(3.5)	42.8(2.7)	27.0(4.3)	17.6(4.8)
	1988	41.8(2.7)	37.8(3.7)	45.5(2.9)	45.5(3.1)	25.0(4.5)	26.3(6.6)
	1984	42.0(1.2)	40.5(1.5)	43.5(1.7)	45.4(1.4)	26.2(2.8)	28.3(4.3)
FOLKS STORY: CHARACTER TRAIT	1990	38.9(1.9)	35.7(2.1)	42.5(2.8)	42.2(2.0)	24.6(5.1)	30.2(5.8)
	1988	43.2(1.9)	39.1(4.0)	47.1(3.7)	45.0(1.9)	36.3(4.5)	41.4(7.3)
	1984	39.9(1.5)	38.7(2.2)	41.0(1.7)	41.7(1.5)	32.2(3.2)	29.3(8.2)
FOLKS STORY: CHARACTER ACTION	1990	29.9(1.7)	26.2(2.3)	34.0(3.1)	32.5(2.3)	20.3(3.6)	22.2(5.5)
	1988	27.9(2.0)	27.0(2.5)	28.8(3.6)	29.2(2.3)	21.9(3.9)	27.2(5.8)
	1984	29.8(0.9)	28.8(1.7)	30.8(1.8)	31.6(1.2)	21.0(2.5)	27.7(4.5)
FOLKS STORY: MAJOR EVENT	1990	50.1(1.9)	45.3(2.0)	55.3(3.6)	53.4(2.1)	39.1(6.1)	34.5(***)
	1988	50.4(2.3)	47.8(3.3)	53.0(3.2)	53.2(2.6)	34.5(5.1)	45.5(7.4)
	1984	47.5(1.3)	46.8(1.7)	48.1(2.1)	49.6(1.3)	37.4(3.4)	38.5(7.0)
DEFINE NONSENSE WORD "HABBIES"	1990	73.5(2.0)	69.8(2.6)	77.6(2.3)	75.7(2.4)	63.4(6.2)	67.4(7.4)
	1988	73.5(2.4)	68.8(3.4)	78.0(3.1)	76.7(3.3)	60.0(4.3)	64.0(5.6)
	1984	73.1(1.1)	71.9(1.6)	74.4(1.5)	76.8(1.2)	50.4(3.3)	71.8(3.0)
PUZZLE: DESCRIPTION OF BIRD	1990	80.7(1.8)	78.2(2.6)	83.4(2.1)	85.3(1.7)	58.9(5.9)	70.9(7.8)
	1988	83.9(2.5)	83.5(3.0)	84.2(2.8)	86.3(3.1)	73.6(4.4)	76.3(8.2)
	1984	78.7(1.3)	75.4(2.0)	82.0(1.4)	82.9(1.3)	56.6(5.0)	70.4(4.2)
SCIENCE: RESEARCH	1990	22.6(1.8)	21.9(2.3)	23.4(2.7)	25.1(2.1)	13.4(4.5)	15.9(4.3)
	1988	21.7(1.8)	16.9(2.8)	26.4(2.7)	22.6(2.2)	19.0(4.9)	12.0(6.9)
	1984	23.6(1.2)	23.4(2.0)	23.7(1.6)	24.4(1.4)	21.0(3.4)	19.5(4.1)
SCIENCE: EVIDENCE	1990	11.4(1.3)	11.2(1.8)	11.6(1.6)	11.9(1.6)	9.4(2.8)	10.2(5.1)
	1988	10.0(1.5)	9.2(2.0)	10.7(1.8)	11.1(1.9)	9.3(2.0)	2.2(1.8)
	1984	11.4(0.9)	11.9(1.6)	10.8(1.1)	12.2(1.0)	6.3(1.6)	9.7(2.1)
SCIENCE: AREA OF STUDY	1990	29.0(2.0)	29.2(2.6)	28.7(2.8)	31.8(2.1)	20.8(4.8)	14.1(4.3)
	1988	32.9(2.0)	33.6(3.3)	32.3(2.5)	35.4(2.2)	21.4(4.2)	23.2(8.2)
	1984	25.9(1.5)	26.7(1.7)	25.3(1.9)	27.6(1.8)	19.4(2.4)	17.5(3.2)
TIMOTHY STORY: RECALL SETTING	1990	83.0(1.5)	80.4(2.0)	85.6(2.1)	84.2(1.8)	82.3(4.0)	71.2(6.7)
	1988	84.8(1.5)	82.0(2.0)	87.5(1.8)	86.3(1.5)	76.1(4.8)	84.6(4.2)
	1984	85.2(0.8)	81.9(1.5)	88.2(0.9)	86.9(0.8)	80.8(2.4)	73.7(2.8)
MYTH: EXAGGERATION	1990	37.5(2.2)	39.3(2.9)	35.7(3.4)	40.6(2.6)	30.3(6.1)	19.5(6.4)
	1988	36.4(2.5)	39.5(2.8)	33.4(3.5)	38.4(3.0)	26.5(5.2)	35.7(6.4)
	1984	33.6(1.4)	32.6(1.5)	34.5(1.9)	36.7(1.7)	18.7(3.2)	20.1(2.9)

NAEP 1990 READING TREND ASSESSMENT—AGE 9

Percentage of Students Responding Correctly to Reading Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
TWO MEANINGS OF "BATS"	1990	76.3(1.9)	74.9(2.8)	77.8(2.6)	82.6(2.0)	53.8(5.8)	56.3(9.6)
	1988	75.9(2.4)	73.9(3.5)	77.8(2.8)	79.5(2.4)	57.9(4.9)	70.4(8.3)
	1984	73.1(1.5)	67.7(2.0)	78.1(1.6)	77.5(1.7)	53.2(3.4)	59.7(3.2)
BIOGRAPHY: HONORS	1990	52.7(2.0)	48.2(3.1)	57.4(2.8)	57.5(2.7)	34.2(3.9)	30.2(5.3)
	1988	58.0(2.7)	57.1(3.9)	58.9(3.4)	62.0(2.9)	39.9(5.6)	44.1(6.5)
	1984	53.6(1.5)	48.4(2.0)	58.6(2.1)	57.3(1.8)	34.7(2.9)	42.5(6.8)
BIOGRAPHY: ACCOMPLISHMENTS	1990	59.4(2.2)	56.2(3.0)	62.6(3.1)	63.2(2.9)	44.6(5.1)	46.5(6.6)
	1988	60.0(2.3)	59.0(2.8)	61.0(2.9)	62.7(2.6)	46.5(5.3)	52.8(4.7)
	1984	54.9(1.7)	47.7(2.2)	61.5(2.2)	59.0(2.0)	34.2(3.8)	37.8(4.2)
BOXBALL: FACT	1990	52.0(2.0)	50.8(3.0)	53.1(3.4)	53.5(2.3)	48.3(4.6)	39.0(5.9)
	1988	50.1(2.9)	46.3(3.6)	54.1(3.3)	50.9(3.0)	45.0(7.2)	46.8(***)
	1984	51.8(1.5)	49.0(1.9)	54.4(2.2)	55.1(1.7)	39.8(4.3)	39.3(6.8)
BOXBALL: CENTRAL PURPOSE	1990	50.4(2.3)	51.4(2.6)	49.4(3.2)	56.1(2.9)	32.0(3.9)	30.0(4.2)
	1988	53.2(2.9)	51.7(3.5)	54.8(3.9)	57.3(3.3)	35.8(4.5)	48.9(***)
	1984	49.2(1.3)	46.0(1.5)	52.2(1.7)	53.0(1.4)	35.1(2.9)	32.6(4.8)
BOXBALL: SEQUENCE	1990	35.4(2.2)	40.5(3.3)	30.2(2.9)	39.1(2.7)	26.2(5.2)	14.9(3.8)
	1988	40.5(2.2)	44.5(3.2)	36.3(2.4)	44.6(2.9)	26.3(3.9)	27.5(5.4)
	1984	38.3(1.1)	41.0(1.7)	35.7(1.8)	42.6(1.4)	23.1(2.8)	24.9(4.1)
BOXBALL: MAIN IDEA	1990	35.9(1.7)	31.1(2.4)	40.8(2.6)	40.4(2.2)	20.4(3.8)	21.8(5.6)
	1988	35.5(1.9)	35.4(2.3)	35.6(2.7)	37.6(2.4)	26.4(4.1)	37.9(6.5)
	1984	36.8(1.2)	35.6(1.5)	38.1(1.7)	39.6(1.4)	23.2(2.4)	33.9(5.0)
BOXBALL: SUPPORTING IDEA	1990	55.2(1.5)	57.7(2.5)	52.5(2.5)	59.6(1.8)	37.1(4.9)	44.8(5.9)
	1988	59.9(2.0)	63.0(2.9)	56.7(3.3)	65.9(1.8)	37.6(4.8)	45.4(***)
	1984	54.7(1.3)	53.1(2.2)	56.2(1.8)	59.6(1.6)	34.6(2.8)	37.2(5.3)
CIVICS: DOCUMENT DESCRIPTION	1990	17.4(1.6)	18.3(2.2)	16.5(2.3)	18.8(1.9)	14.4(3.5)	10.6(3.8)
	1988	18.8(1.4)	16.6(2.2)	21.1(2.0)	17.7(1.9)	18.4(4.2)	24.6(7.0)
	1984	16.9(1.1)	16.1(1.3)	17.7(1.4)	17.8(1.3)	14.6(2.3)	10.1(2.8)
CIVICS: IMPORTANCE OF COURT	1990	43.4(2.0)	44.2(3.0)	42.6(2.8)	43.2(2.4)	40.6(6.2)	48.5(6.0)
	1988	48.8(2.3)	44.8(3.0)	52.9(3.2)	49.7(2.4)	47.1(7.9)	41.8(8.7)
	1984	45.6(1.5)	45.8(1.9)	45.4(1.7)	46.3(1.6)	43.5(3.3)	35.9(7.6)
CIVICS: VOCABULARY	1990	5.9(1.0)	7.1(1.6)	4.6(1.3)	5.5(1.2)	8.1(3.7)	4.9(2.5)
	1988	7.6(1.1)	6.6(1.3)	3.7(1.9)	5.8(1.1)	11.0(4.0)	17.3(4.2)
	1984	6.8(0.6)	7.3(1.0)	6.4(0.9)	6.5(0.6)	8.6(1.7)	6.9(3.1)
DEFINE NONSENSE WORD "TUP"	1990	61.7(1.9)	60.3(2.7)	63.2(2.5)	66.5(2.0)	40.1(5.8)	60.7(6.0)
	1988	62.4(2.5)	62.0(3.2)	62.8(2.8)	64.4(2.9)	52.2(6.0)	56.6(***)
	1984	57.9(1.6)	53.7(2.3)	61.9(1.9)	62.4(1.8)	37.9(3.5)	46.0(5.1)
U.S. HISTORY: TRANSPORTATION	1990	53.2(2.7)	49.6(3.7)	57.0(3.4)	55.6(3.2)	43.7(7.0)	51.5(7.8)
	1988	61.1(2.2)	58.2(2.8)	64.1(2.8)	64.5(2.6)	45.7(4.7)	57.3(9.1)
	1984	53.4(1.6)	50.7(2.2)	56.0(2.1)	59.0(1.9)	32.0(3.0)	35.0(7.3)
U.S. HISTORY: VOCABULARY	1990	36.5(2.0)	35.8(3.2)	37.2(2.4)	41.3(2.6)	23.9(4.1)	10.5(3.9)
	1988	33.0(2.5)	32.3(3.2)	33.8(3.2)	33.4(2.9)	27.1(4.2)	34.6(7.9)
	1984	34.7(1.5)	33.4(2.1)	36.0(1.8)	38.6(1.9)	18.3(2.9)	23.0(4.7)
PUZZLE: DESCRIPTION OF CHAIR	1990	90.3(1.3)	85.6(2.2)	95.2(1.1)	91.8(1.3)	81.6(4.8)	90.1(4.2)
	1988	89.5(1.5)	88.0(2.0)	91.2(1.9)	91.6(1.7)	80.6(3.8)	86.1(6.5)
	1984	91.8(0.7)	89.7(1.0)	94.0(0.9)	92.7(0.7)	86.5(2.6)	90.8(2.2)
CHARACTER TRAIT: TOY	1990	63.4(2.1)	58.0(3.5)	69.0(2.3)	69.8(2.3)	44.5(5.3)	37.8(4.3)
	1988	58.9(1.9)	53.6(3.2)	64.5(2.7)	62.6(2.2)	45.3(6.0)	51.1(***)
	1984	60.7(1.4)	57.4(1.6)	64.1(1.7)	63.7(1.5)	48.4(3.2)	49.0(***)

NAEP 1990 READING TREND ASSESSMENT—AGE 9

Percentage of Students Responding Correctly to Reading Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
FRONTIER WOMEN: DESCRIPTION	1990	52.4(1.9)	45.9(2.5)	59.2(3.1)	56.8(2.1)	36.0(4.6)	37.4(6.4)
	1988	53.9(2.1)	50.5(3.4)	57.3(2.5)	59.6(2.5)	29.4(4.3)	43.9(6.9)
	1984	56.3(1.4)	52.5(2.0)	60.2(1.9)	60.4(1.4)	40.7(3.6)	38.9(8.4)
FRONTIER WOMEN: ACTIVITIES	1990	44.8(2.0)	40.0(2.9)	49.7(2.7)	46.2(2.4)	44.8(5.7)	25.7(6.2)
	1988	42.8(1.9)	38.8(2.9)	46.9(2.6)	44.7(2.2)	36.2(4.3)	29.6(8.1)
	1984	47.1(1.1)	45.6(1.4)	48.7(1.7)	49.9(1.2)	36.1(2.8)	36.2(3.7)
FRONTIER WOMEN: PRODUCTS	1990	59.9(2.3)	56.0(3.4)	64.0(3.1)	65.3(2.7)	42.3(4.7)	43.2(6.2)
	1988	60.0(2.1)	56.7(2.8)	63.4(3.0)	63.6(2.5)	45.0(4.4)	43.4(***)
	1984	65.4(1.0)	63.7(1.5)	67.2(1.4)	70.8(1.1)	45.6(3.6)	42.5(5.2)
DOG & SHADOW FABLE: INFERENCE	1990	68.0(2.0)	65.8(2.8)	70.2(2.4)	74.0(2.2)	46.4(6.3)	51.5(6.6)
	1988	68.1(2.1)	65.2(3.7)	71.1(3.0)	71.6(2.2)	56.1(5.4)	48.2(9.5)
	1984	67.3(1.4)	66.3(1.7)	68.3(1.8)	72.6(1.5)	47.3(3.7)	45.2(5.7)
DOG & SHADOW FABLE: MORAL	1990	59.8(2.3)	63.5(3.6)	56.0(2.7)	65.7(2.8)	37.4(5.5)	45.3(8.2)
	1988	62.9(2.4)	61.4(2.4)	64.4(3.7)	68.3(3.0)	40.8(5.8)	47.7(***)
	1984	61.5(1.5)	58.9(1.8)	64.2(2.2)	66.4(1.6)	44.5(3.2)	36.6(9.2)
SANDWICH: MAJOR IDEA	1990	43.1(1.8)	42.8(2.7)	43.5(2.7)	45.9(2.3)	33.1(5.7)	32.4(6.2)
	1988	41.0(2.4)	39.8(3.2)	42.4(3.1)	42.2(2.7)	37.6(6.1)	27.3(8.4)
	1984	42.0(1.6)	43.6(2.1)	40.4(2.1)	44.5(2.0)	30.4(1.8)	31.3(3.1)
SANDWICH: SUPPORTING IDEA	1990	61.4(1.9)	55.1(2.7)	68.2(2.7)	66.4(2.2)	46.9(6.2)	38.4(6.5)
	1988	56.5(3.0)	53.9(3.3)	59.1(3.7)	58.6(3.8)	41.9(6.2)	56.8(9.8)
	1984	65.0(1.3)	61.2(1.6)	68.9(1.5)	67.6(1.6)	53.2([illegible].8)	53.1(5.8)
RESULT OF FOOD CHAIN	1990	68.1(2.1)	66.6(3.2)	69.6(2.4)	70.8(2.4)	57.7(7.1)	59.4(5.8)
	1988	68.1(1.9)	63.1(3.0)	73.1(2.7)	70.1(2.7)	55.9(5.8)	64.8(8.3)
	1984	66.3(1.2)	63.8(1.9)	68.8(1.6)	69.1(1.2)	56.0(3.4)	49.4(***)
FOOD CHAIN MAIN IDEA	1990	46.9(2.3)	42.3(3.6)	51.6(2.8)	49.0(2.2)	46.4(8.3)	31.4(5.4)
	1988	46.4(1.9)	45.3(2.7)	47.5(3.1)	48.3(1.9)	30.7(4.6)	43.8(***)
	1984	46.6(1.3)	45.8(2.0)	47.4(1.7)	49.3(1.5)	31.3(3.6)	35.2(4.6)
BEST TITLE FOR SCOTT STORY	1990	30.6(1.8)	30.5(1.9)	30.7(2.4)	31.2(2.2)	30.4(5.8)	28.0(5.9)
	1988	32.2(1.7)	26.0(1.9)	38.4(3.0)	33.7(2.3)	23.1(5.0)	27.3(7.4)
	1984	30.5(1.4)	29.8(1.7)	31.3(1.9)	31.1(1.7)	30.6(3.8)	22.1(4.7)
SCOTT STORY FACT	1990	47.2(2.2)	42.9(2.7)	51.3(3.3)	49.6(2.5)	44.0(4.8)	41.2(5.0)
	1988	55.0(2.0)	46.8(3.0)	63.3(2.7)	56.4(2.6)	50.3(5.7)	54.2(6.6)
	1984	47.4(1.0)	43.9(1.6)	51.0(1.3)	49.0(1.3)	43.1(2.8)	39.2(4.2)
SCOTT STORY DEFINITION	1990	12.5(1.4)	10.7(1.8)	14.2(2.1)	13.3(1.5)	12.2(4.3)	2.0(1.9)
	1988	12.1(1.3)	11.6(1.7)	12.7(2.6)	12.4(1.6)	9.2(2.9)	19.0(5.8)
	1984	16.1(0.9)	15.6(0.9)	16.6(1.6)	16.1(0.9)	16.3(1.5)	10.8(2.3)
SNOWMAN: BEST DESCRIPTION	1990	77.2(1.8)	72.8(2.5)	81.5(2.2)	79.0(2.1)	71.6(4.5)	66.9(5.0)
	1988	81.4(1.7)	80.9(2.5)	81.8(2.8)	84.2(2.2)	71.2(4.9)	68.4(6.7)
	1984	83.8(0.9)	82.0(1.1)	85.7(1.4)	85.6(1.1)	74.7(2.0)	80.4(5.8)
CHARACTER TRAIT: CLOWN	1990	85.4(1.8)	82.1(2.3)	88.5(2.4)	86.1(2.0)	83.3(3.5)	88.4(5.2)
	1988	87.6(2.1)	81.8(4.7)	93.3(1.7)	88.4(2.4)	86.3(6.1)	76.7(8.7)
	1984	86.0(1.1)	82.1(1.8)	90.1(1.3)	87.8(1.3)	78.0(2.7)	82.1(4.7)
NONSENSE WORD 1	1990	67.1(1.9)	65.7(2.6)	68.5(2.9)	70.8(2.0)	53.0(4.8)	58.0(6.1)
	1988	69.1(2.1)	67.5(3.5)	70.7(3.0)	72.0(2.7)	61.4(4.4)	44.9(8.7)
	1984	66.4(1.4)	63.9(1.5)	69.1(1.9)	69.2(1.5)	56.2(3.7)	58.9(8.1)
FACT ABOUT PET CARE	1990	28.5(1.9)	22.3(2.4)	34.5(2.3)	32.1(2.0)	19.3(4.5)	12.6(4.2)
	1988	34.8(2.4)	29.6(3.4)	40.0(2.2)	38.0(3.1)	24.1(4.7)	14.6(5.7)
	1984	35.6(1.3)	32.5(1.4)	38.8(1.7)	40.3(1.7)	21.7(2.6)	17.8(2.5)

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NAEP 1990 READING TREND ASSESSMENT—AGE 9

Percentage of Students Responding Correctly to Reading Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
FACT ABOUT HEALTH OF PET	1990	40.0(1.7)	35.1(2.1)	44.6(3.3)	45.0(2.1)	24.8(4.6)	26.5(5.4)
	1988	40.1(1.8)	36.1(2.8)	44.1(3.1)	42.1(2.3)	33.7(4.9)	25.4(4.8)
	1984	42.8(1.1)	38.9(1.6)	46.9(1.9)	46.7(1.2)	30.4(2.8)	28.3(6.3)
TOOTH POEM: SPEAKER'S IDENTITY	1990	70.7(1.7)	62.5(2.9)	78.5(2.4)	74.0(1.9)	57.3(5.0)	61.3(8.2)
	1988	70.1(2.5)	66.8(3.6)	73.4(2.8)	71.9(3.0)	57.8(5.4)	74.1(6.1)
	1984	70.0(1.4)	62.3(2.1)	78.0(1.4)	73.2(1.3)	57.7(4.3)	58.7(***)
TOOTH POEM: MAJOR EVENT	1990	33.8(1.5)	29.4(2.4)	38.1(2.8)	36.4(1.7)	21.4(4.6)	34.6(7.7)
	1988	37.0(2.4)	35.7(3.0)	38.3(4.0)	39.1(2.8)	28.4(6.3)	21.3(4.9)
	1984	36.1(1.4)	33.3(2.0)	39.0(1.8)	40.3(1.5)	22.2(2.3)	23.3(4.7)
TOOTH POEM: VOCABULARY	1990	24.7(1.7)	21.8(2.5)	27.5(2.2)	27.1(2.0)	15.5(3.7)	26.2(9.7)
	1988	28.0(2.3)	29.7(2.0)	26.2(4.1)	29.7(2.6)	17.5(4.6)	25.7(6.2)
	1984	25.0(1.1)	25.6(1.3)	24.4(1.7)	27.2(1.2)	16.9(2.3)	20.2(5.4)
ADVERTISEMENT FOR CARRIER	1990	43.0(2.0)	36.5(2.6)	49.9(3.3)	47.0(2.2)	29.3(4.1)	27.3(6.4)
	1988	45.7(1.9)	43.2(3.6)	48.0(2.6)	50.3(2.1)	23.4(3.8)	31.9(4.4)
	1984	45.4(1.4)	43.3(1.9)	47.5(1.6)	51.2(1.7)	27.1(2.0)	25.5(3.4)
CARRIER JOB REQUIREMENTS	1990	62.3(2.0)	66.1(2.6)	58.2(2.8)	63.1(2.2)	57.8(4.9)	57.2(6.4)
	1988	55.8(2.1)	56.4(2.5)	55.2(3.4)	58.1(2.5)	47.7(6.7)	45.0(4.8)
	1984	61.2(1.0)	60.4(1.5)	62.0(1.3)	65.0(1.1)	49.5(2.7)	46.5(2.3)
CARRIER JOB RESPONSIBILITIES	1990	51.7(2.3)	51.4(3.7)	52.1(3.0)	54.1(2.5)	44.0(5.5)	38.2(5.0)
	1988	53.7(2.3)	50.1(3.0)	57.3(3.3)	56.5(2.1)	42.5(5.7)	44.9(8.9)
	1984	48.7(1.2)	43.4(1.8)	54.0(1.3)	53.1(1.4)	33.3(2.1)	32.5(2.8)
SILKY STORY FACT	1990	73.1(2.0)	70.5(2.5)	75.9(2.8)	76.9(2.1)	64.8(4.9)	56.7(6.1)
	1988	71.1(2.7)	70.8(3.0)	71.3(3.2)	72.8(3.0)	60.1(4.9)	70.5(9.7)
	1984	72.7(1.1)	69.4(1.4)	75.9(1.4)	76.2(1.1)	59.0(3.1)	61.9(2.3)
HISTORY OF GOLD RUSH FACT	1990	29.4(1.7)	28.5(2.5)	30.3(2.8)	32.1(1.9)	24.7(4.4)	13.1(4.4)
	1988	37.7(2.9)	37.0(4.5)	38.5(3.2)	40.3(3.5)	24.1(5.8)	33.6(6.5)
	1984	30.0(1.1)	29.5(1.3)	30.5(1.3)	32.1(1.3)	21.8(1.9)	24.4(2.7)
WINNIE DRAWING	1990	85.7(1.2)	84.6(2.1)	86.9(1.9)	86.6(1.5)	86.0(3.7)	72.7(6.6)
	1988	84.7(2.2)	84.8(3.2)	84.7(2.6)	86.3(2.6)	77.8(2.9)	80.9(5.3)
	1984	87.3(0.5)	87.1(0.8)	87.4(0.7)	89.8(0.6)	77.9(2.7)	80.6(1.6)
ANGRY POEM: RESOLUTION	1990	50.1(2.2)	48.2(3.1)	52.1(3.2)	56.3(2.7)	36.3(4.5)	17.6(3.1)
	1988	52.4(2.3)	53.3(3.1)	51.4(2.8)	56.0(2.8)	35.4(5.2)	45.2(6.1)
	1984	51.9(1.0)	49.4(1.5)	54.3(1.2)	57.6(1.2)	36.3(2.0)	26.1(3.5)
STARS ARTICLE: PROCESS	1990	44.9(2.1)	44.6(2.8)	45.1(2.9)	49.3(2.7)	31.6(5.6)	33.5(6.4)
	1988	51.9(2.3)	53.6(2.4)	50.2(3.8)	55.6(2.7)	38.9(4.7)	33.2(9.3)
	1984	50.6(1.4)	50.4(1.7)	50.8(1.7)	54.0(1.4)	39.3(3.3)	36.2(3.6)
STARS ARTICLE: CENTRAL PURPOSE	1990	54.4(2.1)	56.6(2.9)	52.2(3.1)	59.3(2.7)	35.0(5.6)	38.3(8.3)
	1988	57.7(2.8)	57.1(4.1)	58.2(3.4)	62.2(3.0)	33.0(4.5)	50.3(4.8)
	1984	48.1(1.3)	46.1(2.0)	50.0(1.4)	53.3(1.4)	28.5(2.9)	31.2(6.0)
STARS ARTICLE: EVIDENCE	1990	41.4(2.0)	45.3(2.7)	37.5(3.1)	43.4(2.4)	35.1(6.2)	23.8(5.3)
	1988	45.7(2.7)	43.9(3.4)	47.3(3.7)	48.3(2.5)	37.2(8.2)	32.1(5.0)
	1984	42.6(1.5)	41.8(1.9)	43.3(1.6)	46.4(1.6)	29.7(2.9)	25.3(4.6)
SENTENCE COMPLETION: "WIND"	1990	60.8(2.3)	60.3(3.4)	61.3(3.0)	63.3(3.1)	51.2(5.0)	48.1(7.0)
	1988	61.1(2.2)	61.6(4.5)	60.7(2.2)	64.7(2.6)	38.3(4.7)	56.6(7.5)
	1984	64.5(0.9)	62.2(1.6)	66.7(1.0)	68.7(1.0)	47.0(2.6)	55.2(4.6)
REPORTER: RECALL INFORMATION	1990	61.3(1.6)	59.8(2.4)	62.8(1.8)	65.5(1.7)	43.8(4.8)	59.1(3.5)
	1988	64.4(1.5)	61.0(1.8)	68.1(2.2)	67.1(1.8)	50.9(3.9)	56.7(7.3)
	1984	59.1(1.3)	60.1(1.5)	58.1(1.6)	63.5(1.6)	43.1(2.8)	47.4(1.8)

NAEP 1990 READING TREND ASSESSMENT—AGE 9

Percentage of Students Responding Correctly to Reading Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
REPORTER: CHANGE OF STYLE	1990	44.1(1.6)	43.4(2.0)	44.7(2.1)	48.7(2.1)	25.6(3.3)	36.3(4.1)
	1988	44.7(1.8)	44.9(2.3)	44.6(2.3)	46.6(2.0)	35.1(3.6)	38.9(3.9)
	1984	43.8(1.2)	43.7(1.7)	43.9(1.5)	47.1(1.4)	29.8(2.8)	37.5(1.9)
REPORTER: RESOLUTION	1990	62.8(1.9)	57.2(2.6)	68.6(2.4)	67.7(2.0)	43.6(4.3)	53.4(4.2)
	1988	65.0(1.8)	58.6(2.5)	71.7(2.1)	68.9(2.4)	47.9(3.4)	52.5(5.0)
	1984	64.4(1.1)	60.6(1.4)	68.1(1.6)	69.8(1.4)	44.3(2.9)	50.9(4.1)
REPORTER: REASON FOR CHANGE	1990	50.6(1.8)	47.2(2.5)	54.1(2.1)	56.5(2.2)	28.3(5.9)	38.6(4.5)
	1988	50.0(1.7)	46.9(2.8)	53.2(1.8)	54.4(2.1)	30.6(3.4)	33.4(5.7)
	1984	49.7(1.1)	47.6(1.4)	51.8(1.6)	54.2(1.4)	35.2(2.5)	35.2(2.6)
IDENTIFYING SCIENCE PASSAGE	1990	49.6(1.6)	48.1(2.1)	51.1(2.3)	54.3(1.9)	32.4(3.3)	42.1(5.9)
	1988	50.5(1.2)	51.0(2.1)	50.1(2.3)	54.1(1.5)	35.2(4.5)	36.2(5.2)
	1984	46.6(1.4)	46.7(2.0)	46.6(1.7)	51.5(1.5)	27.8(2.6)	36.5(2.9)
AUTHOR'S VIEWPOINT ABOUT DOGS	1990	47.0(1.6)	43.8(2.6)	50.3(1.8)	49.4(1.9)	41.3(2.9)	36.5(4.9)
	1988	49.5(1.7)	47.1(2.5)	52.1(2.1)	52.0(1.9)	45.9(3.7)	28.6(5.1)
	1984	46.0(1.0)	44.2(1.3)	47.9(1.4)	48.4(1.1)	38.9(2.6)	35.9(3.1)
SKUNK CABBAGE: REASON FOR NAME	1990	58.1(1.6)	54.9(2.2)	61.3(2.0)	63.7(1.8)	34.7(3.7)	48.4(4.1)
	1988	59.1(1.9)	57.7(2.9)	60.6(2.1)	63.1(2.2)	41.1(3.6)	45.8(5.4)
	1984	57.2(1.2)	55.5(1.6)	58.8(1.5)	62.6(1.6)	35.4(1.8)	43.3(3.1)
SKUNK CABBAGE: DESCRIPTION	1990	52.2(1.9)	51.0(2.3)	53.5(2.5)	55.9(2.3)	38.7(3.2)	41.8(4.1)
	1988	51.0(2.0)	49.2(1.9)	53.0(3.2)	52.9(2.3)	41.1(3.3)	42.7(4.0)
	1984	49.1(1.1)	47.1(1.6)	51.1(1.6)	53.8(1.4)	34.3(2.7)	32.6(2.5)
BREATHING: RESULT OF BREATHING	1990	39.9(1.4)	41.9(1.9)	37.8(1.7)	41.8(1.6)	36.2(4.3)	35.9(5.8)
	1988	39.5(1.6)	40.4(2.7)	38.4(2.0)	39.5(1.9)	38.2(5.5)	44.1(4.8)
	1984	37.8(1.4)	38.7(1.6)	36.9(1.6)	39.8(1.4)	29.9(1.9)	34.6(8.2)
BREATHING: AIR MOVES TO LUNGS	1990	45.0(1.9)	45.2(2.2)	44.8(2.4)	47.9(2.0)	33.7(4.6)	36.3(6.1)
	1988	45.1(1.9)	45.4(1.9)	44.9(3.0)	47.7(2.3)	34.4(3.4)	31.3(5.0)
	1984	44.3(1.5)	45.2(1.6)	43.4(1.9)	48.4(1.7)	32.0(2.5)	29.8(5.0)
BREATHING: FUNCTION OF SACS	1990	28.7(1.4)	26.8(1.9)	30.7(2.0)	29.5(1.6)	22.1(3.7)	30.4(3.4)
	1988	32.1(2.0)	31.2(2.1)	33.0(3.0)	33.4(2.3)	27.4(3.6)	27.2(4.9)
	1984	30.4(0.7)	33.0(1.4)	27.8(1.5)	31.7(1.0)	24.8(2.2)	29.0(3.3)
BREATHING: FORMATION OF CO2	1990	27.4(1.6)	25.6(2.0)	29.4(2.3)	30.7(2.0)	17.9(2.3)	21.6(3.2)
	1988	25.6(1.8)	22.4(1.7)	29.0(2.5)	27.6(2.3)	16.3(2.0)	13.0(3.1)
	1984	26.3(1.1)	24.2(1.5)	28.4(1.1)	28.9(1.4)	18.0(1.9)	16.3(3.4)
BULLFIGHT: MAIN IDEA	1990	53.5(2.5)	52.6(3.6)	54.5(3.2)	59.9(3.0)	32.8(5.3)	30.8(4.3)
	1988	57.0(1.9)	55.8(3.0)	58.1(3.3)	61.5(2.2)	39.5(5.1)	36.0(9.0)
	1984	53.0(1.2)	54.8(2.0)	51.2(1.7)	57.2(1.3)	37.8(3.5)	43.0(2.5)
AUTHOR'S UNHAPPY FEELINGS	1990	77.0(1.9)	70.3(2.9)	84.3(1.8)	81.2(2.1)	62.0(4.3)	66.0(6.1)
	1988	84.4(1.8)	79.4(2.8)	89.2(1.9)	87.5(2.0)	74.0(5.9)	64.8(6.3)
	1984	81.1(1.2)	79.4(1.5)	82.7(1.6)	84.8(1.2)	70.4(3.1)	68.9(5.1)
ALIEN STORY: CHARACTER TRAIT	1990	39.9(2.2)	36.2(2.8)	43.8(2.7)	45.2(2.5)	21.1(4.5)	22.4(7.0)
	1988	40.1(2.1)	34.8(2.8)	45.2(4.3)	45.2(2.5)	22.0(3.6)	23.3(6.5)
	1984	38.9(1.6)	36.5(2.2)	41.3(1.6)	43.1(2.1)	28.2(2.7)	21.1(2.1)
ALIEN STORY: PROBLEM	1990	56.3(2.0)	49.5(2.9)	63.8(2.3)	59.5(2.2)	45.3(5.3)	43.8(6.5)
	1988	60.1(1.6)	55.5(2.2)	64.5(2.5)	64.7(2.0)	45.2(4.0)	43.5(7.8)
	1984	59.1(1.7)	59.7(2.0)	58.5(2.0)	63.1(1.8)	44.2(4.1)	49.7(3.2)
ALIEN STORY: RESOLUTION	1990	43.1(2.4)	40.8(2.7)	45.5(3.6)	46.9(2.4)	29.3(5.1)	35.2(5.3)
	1988	41.5(2.0)	35.3(2.8)	47.4(3.0)	47.7(2.0)	22.0(3.9)	16.9(5.4)
	1984	39.9(1.6)	43.0(2.0)	37.0(1.8)	43.5(2.1)	28.1(2.9)	29.6(4.5)

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NAEP 1990 READING TREND ASSESSMENT—AGE 9

Percentage of Students Responding Correctly to Reading Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
TIMOTHY STORY: RECALL ACTION	1990	65.6(1.9)	58.6(3.1)	73.2(2.3)	69.2(2.4)	58.0(4.3)	41.3(6.5)
	1988	68.1(2.4)	62.0(3.4)	73.9(3.4)	69.7(2.5)	63.3(5.6)	54.0(8.3)
	1984	66.7(1.3)	63.6(1.6)	69.7(1.7)	71.0(1.4)	55.8(3.2)	46.0(3.8)
CONNECT DOTS: ALONG A LINE	1990	70.8(1.9)	65.2(2.6)	76.9(2.4)	74.4(2.5)	58.1(4.0)	61.9(5.8)
	1988	75.8(1.8)	71.1(3.3)	80.2(2.6)	78.8(1.9)	59.6(4.8)	74.8(7.4)
	1984	70.1(1.4)	67.3(1.7)	72.7(1.8)	72.2(1.5)	67.3(2.9)	56.9(8.1)
CONNECT DOTS: TOUCHING CIRCLES	1990	71.3(2.3)	65.4(3.1)	77.6(2.6)	76.3(2.8)	51.4(4.8)	59.1(6.8)
	1988	72.5(2.0)	70.0(2.5)	74.8(2.9)	75.9(2.1)	58.4(4.2)	55.5(8.2)
	1984	86.3(1.0)	85.0(1.4)	87.6(1.3)	87.8(1.0)	81.7(2.7)	83.1(5.7)
CONNECT DOTS: WRITE IN CIRCLES	1990	82.7(1.7)	79.0(2.4)	86.5(1.8)	86.3(2.0)	68.8(5.2)	70.3(7.7)
	1988	86.1(1.6)	82.1(2.3)	89.8(2.3)	88.2(1.6)	74.8(3.8)	83.4(5.8)
	1984	88.0(0.7)	86.2(1.4)	89.7(1.0)	89.8(0.9)	81.9(1.9)	83.1(3.6)

NAEP 1990 READING TREND ASSESSMENT—AGE 13

Percentage of Students Responding Correctly to Reading Trend Items

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
FIND PICTURE FACT	1990	56.3(2.5)	65.1(3.1)	47.4(3.2)	55.9(2.8)	56.2(6.1)	58.1(7.2)
	1988	59.6(2.2)	70.8(2.6)	48.7(3.6)	59.1(2.4)	59.2(4.6)	61.4(***)
	1984	70.0(0.9)	74.8(1.0)	64.7(1.3)	69.6(1.1)	73.3(3.3)	69.5(3.7)
DOCUMENT: PHONE CALLS	1990	45.1(2.0)	44.4(2.7)	45.9(2.6)	46.7(2.8)	42.8(5.4)	36.6(6.1)
	1988	46.6(1.7)	42.3(3.1)	50.8(3.0)	48.2(1.6)	37.4(5.2)	39.2(9.4)
	1984	47.2(1.2)	44.4(1.9)	50.3(1.8)	48.4(1.5)	40.5(2.5)	45.0(2.9)
DOCUMENT: PHONE SERVICES	1990	43.0(2.0)	35.7(2.5)	50.3(2.7)	44.4(2.5)	38.3(4.8)	35.8(5.7)
	1988	42.3(1.8)	38.6(2.6)	45.8(3.1)	42.7(1.9)	39.7(5.0)	46.6(8.4)
	1984	47.1(1.1)	41.1(1.6)	53.6(1.9)	48.4(1.2)	38.3(2.5)	45.9(5.0)
COUPON DOCUMENT: LIMITATIONS	1990	67.3(1.8)	63.0(2.9)	71.5(2.0)	70.7(2.0)	56.9(5.5)	54.9(6.9)
	1988	67.7(2.0)	65.4(2.9)	69.9(3.0)	70.9(2.4)	54.2(5.9)	58.9(6.8)
	1984	63.7(1.1)	60.2(1.6)	67.7(1.8)	67.2(1.2)	51.6(3.0)	51.1(3.2)
COUPON DOCUMENT: EXPIRATION	1990	95.2(0.9)	93.9(1.4)	96.5(1.0)	96.7(0.7)	89.0(4.4)	95.4(2.5)
	1988	95.0(0.9)	93.6(1.5)	96.4(1.1)	96.0(1.1)	90.4(2.3)	94.6(4.2)
	1984	92.6(0.5)	91.4(0.9)	94.0(0.8)	93.3(0.6)	87.6(1.4)	93.4(2.4)
COUPON: VALUE	1990	45.4(2.1)	41.1(3.0)	49.6(2.4)	49.0(2.3)	33.4(6.0)	34.8(5.0)
	1988	45.9(2.1)	45.6(3.2)	46.2(3.3)	49.4(2.4)	30.9(3.5)	27.3(8.8)
	1984	47.7(1.2)	45.9(1.8)	49.6(1.6)	50.4(1.4)	35.7(2.9)	41.3(3.5)
CARAD POEM	1990	58.8(2.0)	56.9(3.0)	60.7(3.0)	62.3(2.1)	48.6(5.3)	36.7(7.3)
	1988	59.9(1.8)	57.1(3.0)	62.6(2.6)	65.0(2.1)	41.9(4.5)	33.2(8.4)
	1984	58.6(1.1)	55.3(1.5)	62.2(1.7)	61.8(1.2)	45.4(3.9)	49.8(2.9)
NUT STORY: PLAN	1990	95.6(0.7)	93.8(1.3)	97.4(0.8)	95.7(0.9)	97.6(1.6)	90.9(3.7)
	1988	97.5(0.6)	95.8(1.3)	99.2(0.5)	97.5(0.7)	96.7(1.1)	100.0(0.0)
	1984	93.4(0.7)	90.7(0.9)	96.3(0.7)	94.2(0.7)	89.1(2.3)	92.7(1.6)
NUT STORY: PROBLEM	1990	81.9(1.6)	77.9(2.4)	86.0(2.0)	85.1(1.8)	77.1(6.4)	57.3(6.0)
	1988	79.1(1.4)	77.4(2.3)	80.7(2.2)	80.5(1.4)	68.9(4.6)	84.2(7.5)
	1984	78.5(1.1)	75.6(1.5)	81.8(1.1)	80.6(1.2)	67.0(3.5)	77.4(2.8)
NUT STORY: GOAL	1990	88.3(1.4)	84.5(2.3)	92.1(1.4)	88.3(1.6)	95.3(2.8)	80.3(5.4)
	1988	90.0(1.3)	87.0(2.0)	92.9(1.8)	90.7(1.4)	82.2(5.1)	99.3(0.9)
	1984	84.1(1.2)	81.4(1.5)	87.1(1.3)	84.8(1.4)	79.8(2.5)	84.4(3.3)
NUT STORY: OUTCOME	1990	81.8(1.7)	77.9(2.4)	85.7(2.0)	85.4(1.6)	71.9(7.2)	59.0(4.5)
	1988	84.7(1.7)	80.6(2.2)	88.7(2.1)	85.0(1.8)	83.2(4.5)	85.3(4.4)
	1984	80.5(1.0)	77.9(1.5)	83.4(1.3)	83.4(1.1)	65.2(3.2)	76.7(2.8)
HISTORY: DEFINITION	1990	75.3(2.1)	75.8(3.0)	74.7(2.5)	79.5(2.0)	69.3(7.2)	61.2(7.5)
	1988	76.7(1.9)	71.3(2.7)	81.7(2.0)	79.9(2.2)	69.2(5.2)	53.8(8.0)
	1984	74.4(0.7)	70.7(1.1)	78.2(1.2)	78.8(0.7)	60.8(2.6)	54.7(3.0)
HISTORY: SURVIVAL	1990	82.6(1.6)	84.6(2.1)	80.6(2.3)	84.5(2.0)	77.0(3.9)	78.5(7.6)
	1988	84.2(1.7)	83.9(2.6)	84.5(1.9)	84.5(2.1)	81.5(4.1)	81.9(5.7)
	1984	82.4(0.9)	81.7(1.4)	83.2(0.9)	85.2(1.1)	72.1(2.3)	72.8(3.0)
HISTORY: LOCATION	1990	63.9(1.9)	64.0(2.6)	63.7(2.8)	67.7(2.1)	57.9(6.4)	50.5(8.7)
	1988	63.9(2.1)	63.6(3.0)	64.1(2.9)	64.9(2.2)	59.4(5.1)	54.8(6.9)
	1984	62.1(0.9)	63.2(1.3)	60.9(1.2)	65.0(0.8)	50.1(3.0)	52.3(4.2)
HISTORY: MAIN PURPOSE	1990	67.6(2.2)	68.6(2.8)	66.6(2.7)	70.7(2.2)	56.5(6.2)	64.1(5.7)
	1988	68.3(1.9)	69.3(3.5)	67.3(3.2)	70.7(2.4)	50.1(6.5)	75.1(7.0)
	1984	64.3(1.2)	62.6(1.7)	66.0(1.3)	68.5(1.3)	47.0(3.0)	51.6(3.6)
CLUB DOCUMENT: FEES	1990	76.3(1.6)	73.1(2.5)	79.5(2.2)	80.8(1.7)	68.4(5.8)	60.2(7.5)
	1988	73.5(1.7)	66.1(2.9)	80.4(2.2)	74.9(2.0)	61.1(5.7)	72.4(9.3)
	1984	70.4(1.0)	68.3(1.3)	72.5(1.5)	74.4(0.9)	56.0(3.3)	56.9(4.2)

NAEP 1990 READING TREND ASSESSMENT—AGE 13

Percentage of Students Responding Correctly to Reading Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
CLUB DOCUMENT: BILLING	1990	28.5(1.9)	23.1(2.6)	33.8(2.3)	31.3(2.8)	22.0(5.5)	21.8(6.6)
	1988	28.9(2.4)	27.7(3.3)	29.9(2.7)	28.6(2.8)	29.8(7.2)	30.9(***)
	1984	26.2(0.8)	24.7(1.2)	27.7(1.1)	27.5(0.8)	18.9(2.7)	25.2(3.6)
CLUB DOCUMENT: REQUIREMENTS	1990	63.6(2.1)	58.9(3.3)	68.3(2.7)	65.0(2.3)	63.3(4.8)	48.0(7.4)
	1988	67.1(1.9)	61.7(3.1)	72.2(1.9)	66.6(2.1)	75.4(5.5)	52.6(***)
	1984	64.2(0.9)	60.9(1.5)	67.5(1.1)	66.9(1.1)	57.5(2.5)	46.5(4.8)
FLY STORY: PROBLEM	1990	6.2(0.9)	6.8(1.4)	5.7(1.4)	5.3(1.0)	8.4(3.3)	8.5(2.2)
	1988	8.3(1.0)	8.2(2.2)	8.4(1.5)	9.8(1.3)	4.3(2.6)	0.0(0.0)
	1984	8.6(0.5)	9.1(0.9)	8.2(0.7)	7.8(0.6)	11.8(1.5)	9.7(2.5)
FLY STORY: RESOLUTION	1990	43.2(2.1)	43.0(2.4)	43.5(2.8)	46.5(2.3)	30.8(5.9)	35.2(5.0)
	1988	45.0(2.5)	41.3(3.6)	48.4(2.8)	47.1(2.6)	34.3(6.4)	40.9(***)
	1984	43.4(0.8)	41.1(1.1)	45.8(1.3)	45.3(1.0)	36.2(3.2)	38.3(5.0)
CHARLEY1 STORY: PROBLEM	1990	59.0(1.7)	51.4(2.4)	66.4(2.5)	62.4(1.8)	46.8(5.8)	51.8(6.4)
	1988	57.3(2.4)	51.7(3.2)	62.6(2.6)	60.3(2.4)	42.5(9.1)	30.3(8.0)
	1984	61.5(1.2)	56.1(1.6)	66.9(1.3)	64.0(1.3)	53.2(3.5)	46.2(4.6)
FLYING: 1ST MACHINE	1990	61.9(1.7)	66.0(2.2)	57.9(2.3)	66.5(1.8)	47.6(6.8)	45.3(7.0)
	1988	64.7(2.0)	67.7(2.5)	61.8(3.4)	68.4(2.4)	60.0(6.8)	34.4(***)
	1984	62.1(1.1)	65.6(1.5)	58.4(1.5)	67.3(1.3)	41.6(3.3)	46.2(3.9)
FLYING: TYPES OF PLANES	1990	65.8(1.7)	66.0(2.5)	65.6(2.3)	69.8(2.0)	57.6(6.5)	56.7(6.6)
	1988	64.4(1.6)	63.1(2.6)	65.7(2.8)	67.4(2.0)	58.5(5.2)	42.2(7.1)
	1984	66.8(1.2)	66.3(1.2)	67.5(1.9)	69.5(1.3)	57.5(3.4)	57.2(3.0)
FLYING: DIFFERENCES	1990	73.8(1.4)	75.1(2.3)	72.5(2.3)	78.2(1.8)	59.1(6.3)	60.6(6.7)
	1988	71.7(1.9)	74.6(2.0)	69.0(3.8)	74.9(2.0)	61.9(6.6)	56.5(7.5)
	1984	73.3(1.0)	73.9(1.4)	72.6(1.5)	77.6(1.1)	53.3(3.1)	65.3(2.0)
SCIENCE: RESEARCH	1990	39.4(2.2)	37.8(3.2)	41.0(2.9)	40.1(2.5)	32.7(5.9)	39.3(7.5)
	1988	41.4(1.9)	38.4(2.4)	44.3(2.5)	42.2(2.4)	33.7(4.2)	50.3(7.3)
	1984	39.6(1.1)	38.7(1.4)	40.5(1.9)	41.0(1.2)	32.4(3.1)	37.8(3.2)
SCIENCE: EVIDENCE	1990	34.9(1.9)	30.0(2.6)	39.6(2.4)	38.7(2.1)	30.5(7.1)	14.0(4.8)
	1988	31.5(2.5)	29.4(2.5)	33.6(3.2)	33.2(2.9)	29.5(5.7)	11.4(4.8)
	1984	31.5(1.1)	28.4(1.7)	34.8(1.3)	34.7(1.3)	19.6(2.3)	20.6(4.5)
PHONE CALL DATE	1990	67.9(1.9)	63.9(2.6)	71.7(2.6)	73.3(2.2)	51.0(5.6)	52.5(5.1)
	1988	66.8(2.3)	61.1(3.5)	72.2(2.6)	70.6(2.7)	54.0(5.7)	51.7(6.5)
	1984	65.0(1.4)	62.7(1.8)	67.4(1.9)	69.8(1.5)	47.6(3.5)	46.3(3.1)
DOCUMENT: PHONE LOCATION	1990	78.3(1.8)	74.0(2.5)	82.4(2.2)	82.7(1.9)	67.7(5.0)	64.7(7.0)
	1988	76.0(1.9)	71.7(2.9)	80.1(2.5)	77.7(2.2)	70.9(4.4)	69.9(4.4)
	1984	77.6(1.2)	77.0(1.5)	78.2(1.5)	79.6(1.3)	71.1(2.2)	69.3(4.2)
DOCUMENT: PHONE CHARGE	1990	85.5(1.5)	78.1(2.4)	92.6(1.2)	87.2(1.5)	81.3(4.6)	82.1(5.1)
	1988	88.9(1.4)	86.7(2.2)	91.1(1.4)	89.8(1.5)	87.9(3.6)	78.7(8.3)
	1984	84.6(0.9)	81.7(1.1)	87.8(1.2)	86.5(1.0)	78.9(3.1)	77.5(3.4)
MYTH: EXAGGERATION	1990	78.1(1.3)	76.6(1.8)	80.0(2.4)	82.3(1.6)	68.5(5.2)	61.2(5.2)
	1988	81.7(1.8)	81.3(2.4)	82.1(2.3)	83.2(1.9)	75.2(5.0)	74.3(6.0)
	1984	76.6(1.4)	75.6(2.0)	77.6(1.6)	80.0(1.3)	60.5(3.9)	67.3(5.1)
STORY: PREDICTION ABOUT MARY	1990	58.4(2.1)	53.3(3.4)	64.4(2.5)	61.3(2.7)	48.5(5.9)	57.9(5.5)
	1988	63.9(2.0)	61.7(2.9)	66.2(2.6)	64.7(2.0)	63.0(5.9)	63.9(7.9)
	1984	58.5(1.2)	55.5(1.7)	61.5(1.8)	60.3(1.2)	54.7(3.0)	48.1(7.0)
SCIENCE: CUE WORDS	1990	52.0(1.7)	49.8(2.5)	54.6(2.4)	52.6(2.0)	50.7(6.0)	48.4(6.7)
	1988	49.3(2.4)	46.0(2.5)	52.9(4.1)	50.9(2.8)	40.3(4.6)	55.1(7.9)
	1984	44.0(1.2)	42.0(1.6)	46.1(1.4)	46.2(1.4)	35.4(2.2)	33.6(7.1)

NAEP 1990 READING TREND ASSESSMENT—AGE 13

Percentage of Students Responding Correctly to Reading Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
BIOGRAPHY: HONORS	1990	84.4(1.4)	79.6(2.1)	90.1(1.8)	86.5(1.6)	79.5(5.3)	75.0(3.6)
	1988	88.1(1.6)	83.5(2.5)	93.1(1.5)	89.0(1.9)	82.2(4.9)	91.6(4.9)
	1984	85.4(1.2)	82.2(1.5)	88.5(1.5)	87.1(1.2)	74.1(3.0)	84.6(4.6)
BIOGRAPHY: ACCOMPLISHMENTS	1990	87.7(1.4)	84.3(2.5)	91.7(1.3)	88.6(1.4)	83.8(5.1)	83.7(5.6)
	1988	90.8(1.3)	88.1(1.9)	93.7(1.2)	90.0(1.6)	91.4(4.1)	94.0(3.8)
	1984	89.5(0.7)	85.9(1.3)	93.0(0.8)	90.7(0.7)	81.4(2.5)	89.9(3.0)
SPORT HISTORY: POPULARITY	1990	80.1(1.7)	79.7(2.2)	80.4(2.5)	82.1(1.7)	75.9(5.2)	74.5(5.3)
	1988	76.0(1.4)	75.6(1.7)	76.4(2.5)	80.3(1.7)	57.7(4.4)	68.6(6.1)
	1984	76.2(1.0)	73.2(1.6)	79.4(1.2)	77.9(1.3)	69.1(2.7)	71.4(3.9)
SPORT HISTORY: ROYALTY	1990	77.2(1.7)	73.1(2.6)	81.1(2.3)	80.3(1.6)	70.7(6.5)	64.6(6.6)
	1988	78.7(1.7)	75.5(2.8)	81.8(2.3)	80.7(2.1)	73.8(4.8)	64.4(9.3)
	1984	78.0(1.1)	76.3(1.7)	79.9(1.1)	80.1(1.3)	69.6(2.5)	70.1(2.9)
SPORT HISTORY: GENERAL	1990	65.1(1.8)	61.3(2.9)	68.8(2.4)	66.7(2.2)	66.1(4.5)	54.3(5.1)
	1988	66.6(2.4)	66.0(3.4)	67.2(3.6)	67.6(2.7)	63.1(5.3)	60.6(***)
	1984	62.3(1.5)	59.6(2.1)	65.3(2.1)	64.4(1.7)	55.5(3.9)	57.0(4.3)
SPORT HISTORY: ENGLISH	1990	52.8(2.0)	53.1(2.8)	52.6(3.4)	52.6(2.2)	48.5(7.4)	63.4(6.3)
	1988	52.4(1.8)	55.3(2.6)	49.6(2.8)	53.0(2.2)	45.9(5.5)	57.4(6.8)
	1984	55.1(1.3)	58.0(1.8)	52.0(1.6)	57.5(1.5)	46.7(3.0)	48.5(6.4)
SPORT HISTORY: CONTEMPORARY	1990	78.3(1.8)	80.7(2.3)	76.0(2.7)	81.5(1.9)	67.8(6.4)	66.5(7.5)
	1988	79.1(1.6)	82.2(2.5)	76.0(3.1)	82.0(1.6)	69.4(6.4)	68.3(7.3)
	1984	79.0(1.1)	82.5(1.1)	75.1(1.9)	82.6(1.4)	64.8(2.6)	67.2(2.5)
CIVICS: DOCUMENT DESCRIPTION	1990	33.0(1.9)	29.0(2.5)	36.9(2.5)	34.5(2.0)	32.1(5.3)	24.5(6.3)
	1988	33.8(2.3)	28.2(3.0)	39.1(3.5)	35.8(2.5)	31.5(4.5)	13.8(5.3)
	1984	30.1(1.1)	27.4(1.6)	33.0(1.5)	32.9(1.3)	21.5(2.5)	19.7(4.2)
CIVICS: IMPORTANCE OF COURT	1990	59.1(1.9)	55.4(3.0)	62.8(2.2)	58.3(2.3)	60.7(5.5)	71.6(5.2)
	1988	57.5(3.0)	54.3(4.2)	60.6(4.0)	58.6(3.3)	59.4(5.5)	39.9(9.2)
	1984	57.1(1.3)	55.3(1.6)	59.0(1.7)	57.8(1.4)	53.3(3.0)	57.4(2.5)
CIVICS: VOCABULARY	1990	7.3(1.0)	9.0(1.8)	5.6(1.3)	8.0(1.3)	5.3(2.0)	4.2(1.7)
	1988	6.0(1.1)	6.9(1.7)	5.2(1.3)	5.8(1.1)	5.3(2.7)	7.6(4.6)
	1984	9.5(0.6)	9.9(1.0)	9.0(0.8)	9.7(0.7)	10.6(1.6)	5.3(1.3)
U.S. HISTORY: TRANSPORTATION	1990	85.9(1.3)	84.2(1.8)	87.6(1.8)	87.6(1.5)	79.5(4.0)	81.1(7.0)
	1988	84.1(1.7)	80.0(2.3)	88.1(2.3)	86.1(1.7)	84.8(4.2)	55.0(6.9)
	1984	84.5(0.9)	81.2(1.3)	88.2(1.0)	87.1(1.0)	74.4(2.9)	74.2(4.1)
U.S. HISTORY: VOCABULARY	1990	73.4(2.3)	72.5(3.1)	74.3(3.0)	77.1(2.6)	64.0(5.7)	61.5(7.0)
	1988	74.4(2.1)	72.2(3.0)	76.5(3.2)	79.2(2.3)	61.1(5.8)	45.5(8.1)
	1984	74.6(1.0)	73.0(1.7)	76.3(1.6)	78.8(1.2)	60.1(2.9)	56.2(5.5)
SUMMER JOB: APPLY FOR SS CARD	1990	76.5(1.7)	71.9(2.4)	80.9(2.2)	78.9(1.9)	69.2(5.7)	65.5(6.9)
	1988	78.5(1.5)	76.1(2.8)	80.9(2.3)	81.5(1.9)	71.7(4.7)	62.5(4.6)
	1984	74.9(1.3)	70.6(1.4)	79.0(1.6)	77.7(1.2)	61.8(3.5)	70.3(4.3)
SUMMER JOB: WHEN TO LOOK	1990	56.7(1.9)	51.5(2.8)	61.6(2.4)	59.7(1.9)	52.1(5.1)	38.6(6.7)
	1988	57.1(2.1)	50.5(3.1)	63.4(3.1)	59.1(2.5)	54.9(4.6)	43.4(8.1)
	1984	57.6(1.3)	51.5(1.8)	63.5(1.6)	60.9(1.6)	39.6(2.9)	55.8(5.0)
SUMMER JOB: DOCUMENTS NEEDED	1990	59.6(1.9)	58.2(3.1)	60.8(2.7)	63.6(1.9)	53.4(5.0)	43.1(9.8)
	1988	54.3(1.9)	51.4(3.0)	57.2(2.3)	56.6(2.4)	50.1(3.9)	40.9(7.3)
	1984	55.7(1.5)	52.2(1.8)	59.2(1.6)	59.2(1.4)	40.3(3.0)	45.4(4.8)

NAEP 1990 READING TREND ASSESSMENT—AGE 13

Percentage of Students Responding Correctly to Reading Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
SUMMER JOB: JOB REFERENCES	1990	47.7(2.0)	39.9(2.4)	55.1(2.8)	52.1(2.3)	36.4(6.0)	33.0(5.0)
	1988	50.2(2.3)	46.0(3.5)	54.3(3.0)	54.4(2.3)	32.8(5.4)	38.4(6.1)
	1984	45.2(1.1)	43.5(1.9)	46.8(1.4)	47.5(1.2)	34.1(3.8)	41.4(3.4)
BOBBY STORY FACT	1990	68.8(1.9)	62.8(2.5)	74.6(2.5)	71.6(1.8)	64.3(5.0)	58.5(6.6)
	1988	73.6(1.7)	70.5(3.0)	76.7(2.5)	73.8(2.0)	80.0(4.0)	58.2(7.8)
	1984	72.3(1.1)	68.0(1.4)	76.4(1.6)	75.8(1.2)	55.3(2.8)	64.2(3.5)
CENTRAL PARK STORY MAIN IDEA	1990	65.5(1.8)	60.3(2.9)	70.5(2.6)	69.1(2.3)	55.6(5.3)	53.2(7.8)
	1988	66.1(2.2)	61.4(3.2)	70.5(2.6)	67.6(2.3)	64.4(6.4)	48.3(7.2)
	1984	66.5(1.0)	64.2(1.5)	68.7(1.4)	68.9(1.1)	54.6(3.3)	60.9(4.9)
COMPARISON OF CHARACTERISTICS	1990	71.6(1.8)	69.6(2.5)	73.4(2.5)	73.9(2.0)	69.9(5.0)	56.5(8.6)
	1988	67.7(2.1)	64.2(3.6)	71.0(2.4)	71.6(2.2)	58.8(5.0)	42.9(6.4)
	1984	67.7(1.4)	64.8(1.7)	70.5(2.0)	70.0(1.3)	56.7(3.4)	63.3(6.0)
STEPS IN PERFORMING A TRICK	1990	87.6(1.3)	84.3(1.6)	90.7(1.8)	89.3(1.5)	85.4(4.4)	81.5(5.4)
	1988	84.5(1.3)	79.0(2.7)	89.5(1.5)	84.6(1.6)	85.8(3.5)	80.6(8.8)
	1984	82.7(1.0)	77.3(1.5)	87.7(1.5)	84.9(1.0)	70.7(4.1)	79.2(4.0)
SETTING FOR A TRICK	1990	63.4(1.8)	59.2(2.7)	67.3(2.4)	67.8(2.1)	48.0(6.7)	46.2(9.5)
	1988	69.1(1.9)	63.4(2.7)	74.4(2.4)	68.8(2.3)	70.5(3.8)	63.5(9.1)
	1984	69.2(1.6)	66.0(2.1)	72.2(1.9)	71.9(1.5)	55.8(5.1)	62.3(6.1)
RESULT OF FOOD CHAIN	1990	75.3(2.0)	70.5(2.7)	79.9(2.2)	77.7(2.0)	66.2(5.7)	65.1(7.7)
	1988	80.7(2.1)	76.9(3.2)	84.2(2.5)	81.2(2.4)	78.4(4.9)	75.6(***)
	1984	78.3(1.1)	75.7(1.0)	80.7(1.7)	81.0(1.1)	62.9(3.6)	70.3(9.0)
FOOD CHAIN MAIN IDEA	1990	66.7(2.3)	64.5(2.9)	68.9(3.0)	67.9(2.5)	57.7(5.8)	65.6(9.9)
	1988	66.0(2.0)	65.6(2.9)	66.4(2.5)	68.4(2.7)	54.2(6.7)	61.0(6.8)
	1984	62.4(1.4)	61.4(1.9)	63.3(1.5)	64.3(1.6)	53.5(4.1)	49.4(7.5)
BEST TITLE FOR SCOTT STORY	1990	42.5(2.1)	40.8(3.4)	44.1(3.1)	43.8(2.4)	37.5(6.3)	39.5(4.9)
	1988	47.2(2.1)	43.3(2.8)	51.0(3.4)	48.7(2.5)	40.4(5.2)	37.1(8.8)
	1984	41.5(1.2)	38.7(1.9)	44.4(1.4)	42.0(1.2)	39.8(3.8)	41.6(4.4)
SCOTT STORY FACT	1990	70.6(1.7)	65.4(3.1)	75.6(2.3)	70.6(2.0)	74.4(4.9)	68.9(6.9)
	1988	70.8(2.0)	67.6(3.0)	74.0(2.9)	69.0(2.5)	73.6(3.7)	80.6(5.1)
	1984	71.1(1.3)	68.9(1.8)	73.4(1.5)	70.3(1.5)	74.6(2.5)	69.9(4.8)
SCOTT STORY DEFINITION	1990	32.3(1.9)	33.0(3.1)	31.7(2.5)	33.8(2.2)	26.5(4.5)	26.8(5.6)
	1988	28.5(2.0)	27.7(2.0)	29.3(3.2)	28.8(1.8)	25.8(4.9)	28.1(***)
	1984	28.2(1.2)	27.6(1.7)	28.8(1.6)	29.8(1.4)	25.3(2.5)	21.5(3.7)
FIGURE NAME	1990	85.7(1.5)	88.7(1.7)	82.8(2.7)	88.0(1.7)	78.9(3.7)	78.8(7.0)
	1988	86.6(1.3)	86.2(2.3)	87.0(2.1)	88.0(1.8)	81.8(2.8)	79.6(7.5)
	1984	81.6(1.1)	81.3(1.4)	81.8(1.3)	84.7(1.1)	68.9(3.2)	73.6(6.9)
DESCRIPTION OF PERSON	1990	95.9(0.9)	95.8(1.2)	95.9(1.1)	96.4(1.0)	95.8(2.0)	88.6(6.1)
	1988	96.3(0.9)	93.9(1.7)	98.7(0.6)	96.4(1.0)	98.6(1.0)	86.2(4.9)
	1984	97.2(0.4)	96.1(0.5)	98.4(0.6)	98.2(0.3)	94.3(1.6)	93.1(3.2)
NONSENSE WORD 1	1990	88.5(1.4)	85.6(2.3)	91.4(1.4)	91.1(1.6)	78.1(3.7)	82.6(6.1)
	1988	88.6(1.5)	87.0(1.8)	90.1(2.0)	90.9(1.5)	83.0(5.9)	73.6(6.2)
	1984	87.8(0.8)	86.4(1.1)	89.3(1.2)	90.4(0.7)	79.4(2.4)	77.5(4.3)
FACT ABOUT PET CARE	1990	63.5(2.0)	58.7(2.7)	68.2(3.0)	68.0(2.2)	45.9(5.7)	61.0(***)
	1988	61.9(1.8)	52.1(2.7)	71.4(2.6)	66.9(2.0)	42.8(6.5)	48.5(7.6)
	1984	60.2(1.1)	54.8(1.3)	66.0(1.5)	67.0(1.1)	38.3(2.6)	39.2(4.8)
FACT ABOUT HEALTH OF PET	1990	62.2(1.7)	58.3(2.6)	66.0(2.4)	64.9(1.9)	56.9(5.0)	47.7(***)
	1988	61.3(2.2)	58.9(3.6)	63.7(2.7)	66.9(2.3)	37.5(8.1)	54.2(***)
	1984	64.9(1.1)	63.3(1.6)	66.6(1.7)	71.4(1.2)	41.9(2.3)	43.4(5.0)

NAEP 1990 READING TREND ASSESSMENT—AGE 13

Percentage of Students Responding Correctly to Reading Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
SPORT: MAIN REASON	1990	59.1(1.8)	57.2(2.6)	61.0(2.6)	63.1(2.1)	45.9(5.4)	36.5(7.7)
	1988	64.0(1.9)	58.6(2.5)	69.4(2.3)	66.2(2.1)	49.1(3.2)	68.3(8.6)
	1984	56.1(1.4)	53.0(1.8)	59.3(1.8)	61.9(1.4)	33.3(2.9)	40.9(4.9)
TRIP LENGTH IN JAMES BIOGRAPHY	1990	96.4(0.7)	94.9(1.4)	97.8(0.7)	96.7(0.8)	96.2(2.2)	94.9(3.7)
	1988	96.7(0.9)	95.6(1.3)	97.8(1.1)	97.2(1.0)	93.0(3.3)	96.8(2.9)
	1984	98.5(0.2)	98.0(0.4)	99.0(0.4)	98.8(0.2)	97.1(1.0)	98.1(1.2)
IMPORTANCE OF JAMES'S TRIP	1990	62.8(1.8)	62.2(2.3)	63.4(2.7)	67.7(1.9)	54.3(7.1)	44.8(6.6)
	1988	63.7(1.4)	64.4(2.3)	63.0(2.6)	66.5(1.9)	51.6(4.9)	43.0(7.7)
	1984	67.1(1.5)	68.1(2.1)	66.0(2.0)	71.3(1.4)	50.3(4.8)	52.7(5.4)
HARDSHIPS ENDURED BY JAMES	1990	92.7(1.0)	91.1(1.5)	94.4(1.4)	93.4(1.2)	92.1(2.9)	90.0(4.1)
	1988	93.4(1.0)	90.5(1.7)	96.1(1.0)	93.7(1.2)	92.9(2.4)	87.2(5.5)
	1984	95.5(0.6)	94.1(0.8)	97.0(0.7)	96.3(0.5)	92.6(1.8)	91.3(4.1)
PHONE DOCUMENT FOR NEW YORK	1990	53.4(2.0)	54.4(2.9)	52.3(2.7)	57.5(2.0)	41.4(5.9)	35.5(6.1)
	1988	51.0(2.5)	49.4(3.2)	52.5(3.0)	53.1(2.6)	47.7(8.7)	37.0(***)
	1984	52.6(1.3)	52.7(2.0)	52.5(1.7)	55.0(1.4)	41.3(3.5)	49.9(4.5)
PHONE DOCUMENT FOR SYRACUSE	1990	76.5(1.8)	72.2(2.7)	80.8(2.3)	80.3(1.8)	65.3(5.6)	65.6(5.5)
	1988	74.9(1.5)	67.2(2.8)	82.1(1.9)	76.2(1.9)	73.5(4.7)	53.5(***)
	1984	74.2(1.0)	73.3(1.8)	75.2(1.2)	77.1(1.2)	63.0(2.7)	66.5(3.2)
TIRESOME JOBS - 1900'S	1990	53.4(1.9)	48.6(2.8)	58.2(2.3)	59.0(1.9)	40.7(6.1)	39.6(5.4)
	1988	57.1(2.0)	52.4(3.0)	61.5(3.1)	59.5(2.2)	42.8(6.0)	51.2(***)
	1984	58.0(1.6)	55.5(1.8)	60.5(2.4)	60.6(1.6)	44.8(4.1)	49.9(8.1)
JOBS IN THE WOODS - 1900'S	1990	61.1(2.2)	56.1(2.6)	65.9(3.4)	66.2(2.5)	48.8(4.8)	48.5(6.9)
	1988	64.4(2.2)	59.3(2.8)	69.1(2.7)	69.0(2.2)	41.1(4.4)	51.8(***)
	1984	68.7(1.4)	64.0(2.1)	73.6(2.0)	72.4(1.5)	51.3(2.8)	63.8(6.9)
HOME JOBS - 1900'S	1990	75.1(1.5)	67.3(3.0)	82.8(2.2)	79.2(1.7)	73.2(4.0)	54.4(6.4)
	1988	78.5(1.6)	70.6(2.4)	86.0(2.2)	79.9(1.7)	73.9(5.0)	61.4(8.2)
	1984	81.8(1.1)	77.2(1.6)	86.7(1.2)	84.5(1.2)	68.2(3.9)	77.3(4.5)
ADVERTISEMENT FOR CARRIER	1990	82.9(1.4)	79.0(2.3)	87.5(1.7)	86.0(1.5)	72.8(4.8)	77.5(4.1)
	1988	83.0(2.1)	80.0(3.1)	86.2(2.3)	84.6(2.0)	75.9(5.6)	81.8(6.2)
	1984	78.6(1.2)	76.4(1.8)	80.8(1.6)	82.2(1.1)	60.5(3.3)	69.5(6.7)
CARRIER JOB REQUIREMENTS	1990	80.2(1.7)	78.9(2.7)	81.8(2.4)	84.5(1.9)	65.9(5.4)	69.4(5.6)
	1988	83.4(1.7)	83.3(2.2)	83.5(2.3)	86.9(1.6)	69.6(6.4)	72.4(7.4)
	1984	82.2(1.0)	80.6(1.7)	83.8(1.4)	84.6(1.1)	72.4(2.7)	71.8(3.3)
CARRIER JOB RESPONSIBILITIES	1990	79.5(1.4)	75.0(2.2)	84.9(2.1)	82.2(1.5)	71.0(5.2)	70.7(4.7)
	1988	83.0(1.8)	79.5(2.3)	86.8(2.2)	84.8(1.9)	76.5(5.5)	79.5(***)
	1984	78.5(0.9)	76.0(1.2)	81.0(1.1)	81.2(0.9)	66.5(2.9)	68.9(4.4)
SILKY STORY FACT	1990	86.9(1.3)	82.1(2.0)	92.6(1.6)	89.2(1.1)	77.1(6.3)	84.3(3.6)
	1988	91.4(1.3)	88.7(1.8)	94.3(1.4)	92.2(1.4)	84.7(4.0)	91.6(3.8)
	1984	89.8(0.9)	86.1(1.4)	93.5(0.9)	91.3(1.0)	84.0(1.9)	83.4(3.9)
HISTORY OF GOLD RUSH FACT	1990	58.6(2.2)	51.7(3.0)	66.7(2.8)	61.4(2.8)	53.0(5.7)	47.5(6.6)
	1988	63.4(2.0)	57.4(3.1)	69.7(2.5)	68.1(2.2)	55.5(4.7)	40.0(***)
	1984	50.6(1.4)	47.2(1.7)	54.1(1.6)	53.5(1.6)	36.9(2.7)	42.8(7.1)
WINNIE DRAWING	1990	94.1(0.8)	93.3(1.4)	95.0(1.0)	94.6(1.0)	92.7(2.6)	89.9(3.1)
	1988	95.7(0.9)	95.1(1.0)	96.3(1.2)	94.5(1.2)	98.3(1.7)	100.0(0.0)
	1984	93.3(0.5)	92.0(0.6)	94.7(0.8)	94.4(0.5)	87.7(2.1)	91.7(2.4)
HISTORY OF ARTS BEFORE 1940	1990	23.6(1.9)	26.0(2.9)	20.7(2.3)	24.2(2.3)	22.4(4.4)	19.5(6.1)
	1988	23.8(1.6)	24.4(2.6)	23.2(2.2)	25.2(2.0)	25.6(3.2)	12.5(5.6)
	1984	22.1(1.0)	22.6(1.8)	21.7(1.3)	23.4(1.2)	16.3(1.9)	15.5(2.6)

NAEP 1990 READING TREND ASSESSMENT—AGE 13

Percentage of Students Responding Correctly to Reading Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
HISTORICAL PRIVILEGE OF ARTS	1990	34.4(1.4)	33.8(2.7)	35.1(2.4)	35.7(1.8)	26.1(3.9)	34.7(5.5)
	1988	36.7(2.3)	36.1(2.7)	37.4(3.6)	39.1(3.0)	32.9(5.4)	18.5(5.8)
	1984	35.2(1.1)	35.7(1.7)	34.8(1.6)	37.9(1.3)	24.5(2.9)	24.3(3.8)
MASS PRODUCTION OF ART	1990	19.8(1.5)	19.8(2.3)	19.8(2.0)	19.9(1.6)	18.3(4.3)	22.7(5.2)
	1988	22.2(2.1)	20.9(2.8)	23.5(2.5)	22.5(2.7)	17.7(3.1)	22.4(4.8)
	1984	21.5(1.1)	19.0(1.7)	23.9(1.3)	21.5(1.3)	23.8(2.5)	16.7(2.9)
TRAFFIC VIOLATION FACT	1990	64.7(1.8)	65.5(2.5)	63.6(2.6)	66.0(2.0)	61.5(5.5)	65.8(5.5)
	1988	67.1(2.4)	67.6(2.8)	66.6(3.9)	67.9(2.8)	60.8(4.0)	73.0(7.5)
	1984	62.8(1.3)	60.0(2.1)	[illegible].4(1.8)	64.8(1.3)	52.2(4.0)	55.5(6.1)
COST OF TRAFFIC FINE	1990	50.3(2.0)	51.1(2.6)	49.5(2.9)	53.7(2.2)	45.1(5.3)	34.3(6.5)
	1988	46.8(2.2)	47.2(3.0)	46.4(2.5)	51.2(2.4)	29.0(5.3)	43.7(***)
	1984	49.7(1.1)	51.4(1.6)	48.0(1.5)	53.3(1.3)	37.5(3.1)	30.6(3.3)
TRAFFIC FINE PAYMENT FACT	1990	32.6(1.7)	31.7(2.4)	33.5(2.9)	34.5(2.0)	24.7(5.4)	30.5(5.1)
	1988	32.8(2.0)	31.4(3.3)	34.3(2.4)	35.7(2.2)	14.8(5.6)	21.9(6.1)
	1984	31.8(1.2)	33.0(1.4)	30.6(1.7)	33.2(1.1)	22.8(2.6)	35.1(3.2)
SEAL FOOD INFORMATION	1990	59.3(2.1)	56.3(3.0)	62.8(3.2)	63.8(2.2)	41.3(7.1)	47.8(8.2)
	1988	67.2(2.1)	69.4(2.5)	65.1(3.2)	69.6(2.5)	55.7(6.2)	65.8(8.7)
	1984	64.0(1.4)	64.8(1.9)	63.3(1.7)	67.8(1.5)	45.7(2.5)	44.0(5.2)
FACT ABOUT SEALS IN MEXICO	1990	40.8(1.9)	36.7(2.5)	45.7(2.5)	44.6(2.1)	26.8(5.9)	25.8(5.8)
	1988	46.1(2.1)	40.8(3.4)	51.4(3.0)	51.9(2.6)	26.7(5.3)	19.6(9.7)
	1984	45.3(1.3)	40.6(2.0)	49.8(1.5)	48.3(1.6)	29.0(3.3)	29.5(3.8)
DESCRIBE SEALS	1990	46.4(2.1)	44.1(3.0)	49.1(3.0)	50.3(2.7)	32.1(5.9)	36.5(5.4)
	1988	43.6(2.0)	41.4(3.0)	45.7(2.8)	47.3(2.5)	31.2(4.4)	28.7(8.5)
	1984	45.1(1.5)	41.8(1.9)	48.2(2.1)	46.1(1.6)	39.5(3.6)	40.1(6.9)
BIRTH CYCLE OF SEALS	1990	52.2(1.8)	46.0(2.3)	59.4(3.1)	54.6(2.3)	42.6(4.8)	37.5(7.3)
	1988	62.6(1.7)	58.0(2.9)	67.1(2.8)	67.5(2.2)	42.0(4.9)	49.3(***)
	1984	60.9(1.4)	57.8(2.1)	63.9(1.4)	64.7(1.7)	38.9(3.5)	43.1(5.8)
SEALS: DEFINITION	1990	77.6(2.0)	71.9(2.8)	84.4(2.0)	80.2(1.9)	72.6(6.1)	58.0(7.5)
	1988	80.0(2.0)	77.8(3.0)	82.2(2.9)	82.9(2.0)	68.7(7.5)	65.2(***)
	1984	79.9(1.2)	77.9(1.4)	81.8(1.7)	83.0(1.2)	63.5(3.2)	63.3(5.0)
HERO STORY: MAIN IDEA	1990	76.5(1.7)	74.3(2.4)	78.7(2.5)	78.6(2.1)	70.2(6.5)	69.7(9.7)
	1988	79.3(1.8)	78.4(2.5)	80.2(2.3)	80.9(2.4)	71.1(4.5)	75.2(6.2)
	1984	75.0(0.8)	74.7(1.1)	75.3(1.3)	76.6(0.8)	67.7(2.9)	69.2(3.5)
COUNTRY OF HERO IN STORY	1990	90.1(1.2)	86.3(1.5)	93.9(1.3)	90.2(1.4)	92.8(4.0)	89.8(4.3)
	1988	88.3(1.4)	84.4(2.0)	92.1(1.9)	88.2(1.7)	87.3(3.7)	92.2(6.5)
	1984	89.6(0.6)	86.5(0.7)	92.9(0.8)	90.7(0.6)	85.4(2.1)	85.0(3.1)
HERO STORY: FACT	1990	59.3(1.8)	58.7(2.7)	60.0(2.6)	61.6(2.4)	47.1(5.4)	60.6(5.9)
	1988	58.4(1.9)	59.9(2.1)	56.9(3.2)	61.1(2.3)	47.2(5.3)	43.4(8.7)
	1984	59.0(1.2)	59.6(1.6)	58.3(1.5)	62.4(1.4)	44.7(2.5)	48.5(4.8)
MONEY IN HERO STORY	1990	70.2(1.5)	64.4(2.6)	76.0(2.6)	72.2(1.9)	61.5(5.2)	67.7(4.4)
	1988	69.1(2.1)	64.0(2.9)	74.1(3.1)	70.1(2.1)	64.1(5.4)	65.3(9.0)
	1984	73.3(1.0)	69.0(1.5)	77.9(1.3)	74.9(1.1)	66.9(2.1)	69.7(3.5)
HERO STORY: GOAL	1990	78.6(1.5)	74.3(2.0)	82.9(2.2)	80.6(1.9)	75.0(4.8)	67.6(4.9)
	1988	77.4(1.7)	74.4(2.5)	80.3(1.6)	78.3(2.1)	71.4(5.0)	77.2(8.0)
	1984	75.2(0.8)	73.2(1.6)	77.4(1.2)	77.0(0.9)	64.6(2.8)	73.6(2.8)
PURPOSE OF BUSINESS ARTICLE	1990	58.6(1.6)	55.9(2.2)	61.2(2.3)	60.0(1.9)	52.9(6.3)	53.4(6.5)
	1988	59.4(2.1)	55.7(2.5)	62.9(3.3)	62.5(2.5)	45.7(5.5)	51.1(9.4)
	1984	55.5(1.1)	52.5(1.4)	58.6(1.1)	58.3(1.1)	46.8(3.3)	43.5(3.5)

NAEP 1990 READING TREND ASSESSMENT—AGE 13

Percentage of Students Responding Correctly to Reading Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
IDENTIFY BUSINESS LIABILITY	1990	35.2(1.8)	31.7(2.4)	38.7(2.5)	37.6(2.0)	29.6(6.1)	23.8(6.5)
	1988	38.5(1.9)	41.8(2.7)	35.4(2.8)	40.7(2.0)	32.2(5.4)	24.2(***)
	1984	35.7(0.9)	36.0(1.1)	35.3(1.5)	38.1(1.0)	25.8(2.7)	29.2(2.4)
DEFINE BUSINESS PROFIT	1990	83.6(1.6)	83.6(2.6)	83.5(1.8)	87.4(1.5)	77.3(6.1)	60.0(5.7)
	1988	84.6(1.8)	85.6(2.5)	83.7(2.6)	87.4(2.0)	77.5(4.2)	63.1(***)
	1984	85.7(0.6)	85.9(0.9)	85.5(0.9)	88.1(0.7)	76.7(2.3)	75.0(2.4)
ONE PURPOSE OF TREES	1990	79.1(1.6)	76.1(1.8)	82.0(2.0)	82.6(1.7)	67.5(6.1)	64.7(9.5)
	1988	80.7(1.9)	80.5(2.4)	80.9(2.7)	82.9(2.1)	67.8(5.8)	79.5(8.3)
	1984	81.9(0.8)	81.3(1.3)	82.4(0.9)	84.4(0.9)	70.9(2.5)	75.4(2.0)
SECOND PURPOSE OF TREES	1990	46.3(2.2)	46.9(2.7)	45.7(3.4)	51.7(2.6)	30.2(5.7)	21.8(5.7)
	1988	53.6(2.6)	53.9(3.6)	53.3(2.8)	57.3(2.9)	35.4(5.0)	41.2(8.9)
	1984	52.1(1.2)	51.9(1.6)	52.2(1.3)	56.3(1.4)	36.6(2.5)	34.9(3.8)
PURPOSE OF GREEN BELT	1990	73.9(1.6)	75.4(2.6)	72.4(2.0)	76.2(1.9)	68.4(5.1)	61.2(8.2)
	1988	78.3(1.8)	77.1(2.7)	79.4(2.8)	81.0(1.7)	60.7(8.6)	76.4(8.1)
	1984	72.7(1.0)	70.9(1.2)	74.6(1.5)	76.5(1.0)	56.6(2.8)	59.8(3.4)

NAEP 1990 READING TREND ASSESSMENT—AGE 17

Percentage of Students Responding Correctly to Reading Trend Items

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
COMPUTER CHIP: CENTRAL PURPOSE	1990	71.0(2.2)	69.4(3.2)	72.7(2.5)	74.5(2.2)	55.7(4.7)	71.1(8.1)
	1988	72.5(1.6)	74.0(2.5)	71.1(2.6)	76.5(1.7)	57.7(4.7)	65.2(6.2)
	1984	68.3(1.5)	67.2(1.3)	69.4(2.1)	72.5(1.3)	51.5(4.2)	53.3(4.7)
COMPUTER CHIP: SUPPORTING IDEA	1990	52.1(2.0)	52.7(3.4)	51.6(2.2)	54.8(2.6)	40.1(4.5)	51.2(***)
	1988	50.4(2.3)	47.6(3.4)	53.0(3.2)	52.3(2.6)	49.3(5.6)	32.5(6.2)
	1984	47.5(0.8)	44.2(1.5)	51.0(1.5)	51.5(1.0)	30.3(2.4)	33.1(4.6)
COMPUTER CHIP: VOCABULARY	1990	29.1(1.8)	29.9(2.6)	28.2(2.6)	29.6(2.2)	22.2(5.1)	40.6(7.5)
	1988	26.1(2.3)	27.6(2.7)	24.9(2.9)	25.7(2.3)	27.7(6.0)	24.7(6.3)
	1984	28.2(1.0)	29.1(1.4)	27.3(1.6)	29.4(1.1)	21.9(2.5)	27.6(3.2)
COUPON DOCUMENT: LIMITATIONS	1990	77.5(2.2)	71.4(3.2)	83.8(2.4)	80.4(2.5)	65.2(6.0)	74.2(***)
	1988	81.2(1.3)	76.3(2.5)	85.2(1.8)	83.3(1.8)	71.5(5.1)	78.1(7.7)
	1984	73.7(1.1)	69.3(1.8)	78.2(1.2)	77.8(1.2)	60.5(3.0)	52.8(4.1)
COUPON DOCUMENT: EXPIRATION	1990	96.6(0.8)	94.6(1.4)	98.7(0.6)	96.3(0.9)	98.1(0.9)	95.3(3.1)
	1988	97.5(0.6)	96.5(1.2)	98.3(0.6)	97.5(0.8)	96.0(1.5)	100.0(0.0)
	1984	95.3(0.5)	94.0(0.7)	96.6(0.8)	96.4(0.4)	91.8(1.2)	90.5(3.5)
COUPON: VALUE	1990	70.8(2.0)	69.9(2.4)	71.7(3.1)	74.9(2.0)	54.4(5.7)	66.5(***)
	1988	71.3(2.3)	73.0(3.9)	69.7(2.8)	72.8(2.6)	68.7(4.4)	67.3(8.3)
	1984	74.1(1.3)	72.2(1.6)	76.0(1.8)	79.3(1.2)	52.9(3.4)	55.1(5.7)
CARAD POEM	1990	78.7(1.8)	75.8(2.5)	81.8(2.2)	81.1(1.8)	69.7(5.2)	76.8(9.7)
	1988	78.5(1.7)	78.4(2.8)	78.4(2.6)	82.1(2.1)	69.0(4.7)	51.3(7.9)
	1984	77.6(0.9)	75.8(1.4)	79.6(1.1)	82.2(0.9)	58.9(3.3)	65.5(5.4)
NUT STORY: PLAN	1990	96.5(0.7)	94.2(1.3)	98.8(0.6)	96.1(0.9)	97.4(1.6)	97.3(2.7)
	1988	97.4(0.8)	94.9(1.6)	99.5(0.4)	96.9(1.0)	98.4(1.7)	100.0(0.0)
	1984	96.4(0.5)	94.6(0.7)	98.3(0.6)	97.1(0.4)	95.5(1.0)	91.3(4.0)
NUT STORY: PROBLEM	1990	87.8(1.2)	81.2(2.2)	94.6(1.4)	87.3(1.3)	85.6(3.4)	95.3(3.0)
	1988	91.6(1.2)	87.8(2.5)	94.7(1.2)	91.8(1.5)	92.7(2.4)	87.3(7.7)
	1984	88.8(0.8)	85.9(0.9)	91.8(1.3)	90.8(0.8)	79.5(3.2)	83.7(3.9)
NUT STORY: GOAL	1990	90.7(1.3)	86.5(2.2)	95.0(1.2)	91.0(1.4)	89.0(3.1)	92.9(4.6)
	1988	93.9(1.2)	92.5(1.7)	95.1(1.7)	94.9(1.4)	91.2(2.7)	92.2(3.4)
	1984	91.9(0.7)	89.5(1.0)	94.5(0.8)	93.6(0.6)	85.4(2.1)	86.5(3.7)
NUT STORY: OUTCOME	1990	89.1(1.5)	82.7(2.5)	95.5(1.5)	88.5(1.7)	90.1(2.6)	92.9(4.6)
	1988	91.1(1.3)	88.1(1.7)	93.7(1.8)	91.8(1.6)	89.5(3.5)	94.2(4.3)
	1984	90.0(0.7)	87.2(1.1)	92.9(0.9)	92.1(0.8)	83.1(2.0)	80.1(5.1)
CLUB DOCUMENT: FEES	1990	80.8(1.5)	75.9(2.4)	85.8(1.9)	84.7(1.4)	67.5(6.1)	75.0(***)
	1988	86.5(1.4)	87.4(2.2)	85.7(1.6)	87.7(1.5)	83.3(4.1)	80.8(6.2)
	1984	83.6(0.6)	82.6(0.9)	84.7(0.9)	86.6(0.7)	72.0(1.9)	76.5(3.9)
CLUB DOCUMENT: BILLING	1990	36.5(2.1)	33.2(2.7)	39.8(3.2)	37.6(2.4)	29.5(4.8)	34.1(9.0)
	1988	31.4(2.3)	31.3(2.9)	31.6(3.8)	32.1(2.4)	24.1(3.5)	37.6(7.7)
	1984	39.2(0.8)	37.4(1.2)	41.0(1.3)	39.7(0.9)	37.3(2.3)	37.9(1.9)
CLUB DOCUMENT: REQUIREMENTS	1990	77.6(1.8)	76.0(2.5)	79.3(2.7)	80.0(1.5)	68.9(6.8)	79.5(9.5)
	1988	79.8(2.1)	81.1(3.8)	79.0(2.0)	82.8(2.3)	73.0(4.9)	61.3(6.0)
	1984	79.7(0.8)	77.2(1.0)	82.3(1.0)	83.8(0.8)	65.5(2.2)	64.9(2.9)
CHARLEY1 STORY: PROBLEM	1990	85.2(1.5)	80.1(2.5)	90.4(1.6)	86.7(1.6)	78.7(4.2)	86.4(7.4)
	1988	85.9(1.8)	80.5(3.4)	90.6(1.6)	86.9(2.1)	79.0(5.0)	83.8(6.1)
	1984	83.7(0.7)	78.5(1.1)	89.1(0.8)	86.1(0.7)	72.0(2.2)	79.6(3.2)

NAEP 1990 READING TREND ASSESSMENT—AGE 17

Percentage of Students Responding Correctly to Reading Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
FLYING: 1ST MACHINE	1990	78.1(2.0)	82.1(2.9)	73.9(2.7)	81.6(1.7)	62.2(6.3)	76.5(7.6)
	1988	77.5(1.8)	81.0(2.6)	74.0(2.1)	80.8(1.8)	63.9(4.3)	68.5(7.5)
	1984	77.7(1.0)	80.8(1.3)	74.1(1.5)	81.3(1.0)	63.8(3.4)	67.3(4.3)
FLYING: TYPES OF PLANES	1990	81.7(1.8)	79.4(2.3)	84.2(2.3)	84.7(1.6)	72.0(5.5)	74.8(***)
	1988	80.8(1.3)	79.2(2.5)	82.5(2.3)	81.9(1.6)	75.5(4.3)	75.8(***)
	1984	81.1(1.2)	78.9(1.6)	83.6(1.2)	83.3(1.3)	72.2(3.3)	75.0(5.5)
FLYING: DIFFERENCES	1990	86.5(1.5)	84.6(2.5)	88.4(2.0)	89.7(1.4)	74.1(6.6)	86.4(4.9)
	1988	86.1(1.4)	84.5(2.2)	87.7(1.8)	86.5(1.5)	80.8(5.0)	92.2(4.7)
	1984	85.8(1.0)	84.8(1.4)	87.0(1.3)	88.4(1.1)	74.9(2.7)	78.7(3.7)
SCIENCE: RESEARCH	1990	58.0(2.1)	57.0(2.9)	59.0(3.5)	61.5(2.3)	42.2(6.1)	57.7(7.0)
	1988	54.0(2.2)	47.1(3.3)	61.0(2.8)	54.7(2.4)	46.9(4.8)	57.4(8.6)
	1984	54.2(1.1)	52.9(1.8)	55.7(1.3)	56.5(1.3)	42.1(2.6)	51.5(7.3)
SCIENCE: EVIDENCE	1990	57.9(1.9)	52.3(2.7)	63.9(2.5)	59.8(2.1)	54.6(5.9)	44.7(9.8)
	1988	55.9(2.4)	54.3(3.6)	57.5(2.5)	55.5(2.6)	50.3(4.9)	70.3(5.6)
	1984	55.7(1.4)	51.8(1.7)	60.0(1.8)	59.7(1.6)	38.4(3.8)	46.6(3.5)
PHONE CALL DATE	1990	87.3(1.5)	86.8(2.5)	87.8(1.9)	91.5(1.3)	71.3(5.3)	84.4(7.3)
	1988	85.0(2.1)	86.3(2.3)	83.8(3.1)	85.8(2.6)	79.1(4.0)	88.5(4.4)
	1984	86.2(1.2)	83.1(1.5)	89.6(1.2)	89.4(1.1)	73.8(3.2)	74.0(4.0)
DOCUMENT: PHONE LOCATION	1990	90.1(1.3)	88.5(2.2)	91.8(1.2)	92.7(1.2)	81.0(4.9)	87.7(9.0)
	1988	89.2(1.5)	89.7(1.9)	88.8(2.6)	89.6(1.9)	88.4(3.7)	87.1(4.5)
	1984	89.8(0.9)	87.8(1.2)	92.0(1.0)	91.8(0.8)	81.7(3.2)	82.4(3.1)
DOCUMENT: PHONE CHARGE	1990	92.2(1.2)	93.3(1.6)	91.0(1.7)	93.3(1.0)	84.8(4.7)	94.2(3.6)
	1988	94.3(1.3)	94.4(1.5)	94.3(2.1)	93.7(1.6)	95.3(1.9)	97.6(1.4)
	1984	91.6(1.1)	90.4(1.2)	92.9(1.4)	92.3(1.2)	88.3(1.9)	89.8(2.4)
STORY: PREDICTION ABOUT MARY	1990	75.0(1.8)	73.0(2.6)	76.9(2.4)	78.0(2.1)	65.9(4.9)	59.3(9.3)
	1988	74.9(2.0)	71.3(2.8)	78.0(2.6)	79.0(2.5)	69.0(5.1)	49.7(8.3)
	1984	69.7(1.0)	65.3(1.3)	74.6(1.2)	72.7(1.2)	61.8(2.8)	61.3(3.1)
SCIENCE: CUE WORDS	1990	68.9(2.1)	65.5(2.7)	72.2(2.8)	68.8(2.4)	71.4(4.8)	62.2(4.8)
	1988	68.4(3.3)	67.8(3.9)	68.9(4.8)	69.7(3.8)	63.9(7.8)	58.1(***)
	1984	58.4(1.4)	53.8(1.9)	63.4(1.4)	61.4(1.6)	47.9(3.5)	48.2(4.6)
SCIENCE: AREA OF STUDY	1990	83.0(1.8)	81.0(2.4)	85.0(2.5)	85.8(2.1)	73.2(5.4)	75.4(***)
	1988	82.4(2.4)	81.6(2.6)	83.0(2.8)	86.8(2.2)	60.3(7.7)	75.5(9.1)
	1984	76.3(1.1)	73.8(1.6)	79.1(1.5)	79.6(1.3)	63.6(2.8)	67.0(4.0)
BIOGRAPHY: HONORS	1990	96.4(0.6)	95.2(1.0)	97.6(0.8)	96.9(0.6)	95.6(1.9)	91.2(4.6)
	1988	93.6(1.2)	89.7(2.3)	97.0(0.8)	95.8(0.8)	86.8(4.4)	85.5(7.6)
	1984	94.7(0.8)	92.3(1.2)	97.2(0.6)	95.5(0.8)	91.7(1.5)	91.8(1.9)
BIOGRAPHY: ACCOMPLISHMENTS	1990	96.8(0.6)	95.1(1.3)	98.4(0.7)	97.2(0.6)	96.3(1.9)	95.8(3.7)
	1988	94.9(1.0)	91.6(1.9)	97.8(0.8)	95.0(1.1)	96.8(2.4)	89.3(7.0)
	1984	96.2(0.5)	94.2(0.8)	98.4(0.4)	96.3(0.5)	96.3(1.1)	96.3(1.4)
SPORT HISTORY: POPULARITY	1990	85.3(1.6)	84.4(2.4)	86.3(1.8)	88.4(1.6)	78.9(4.6)	78.7(7.0)
	1988	79.0(1.6)	79.1(3.1)	78.8(2.2)	79.3(2.0)	79.4(4.9)	70.6(9.0)
	1984	82.0(1.0)	80.7(1.4)	83.3(1.1)	83.3(1.0)	75.4(2.8)	77.3(3.8)

NAEP 1990 READING TREND ASSESSMENT—AGE 17

Percentage of Students Responding Correctly to Reading Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
SPORT HISTORY: ROYALTY	1990	90.8(1.6)	87.5(2.6)	94.3(1.4)	91.9(1.8)	83.1(4.9)	93.4(2.9)
	1988	86.8(1.9)	85.5(2.9)	88.1(2.3)	86.8(2.2)	82.6(4.1)	92.7(4.8)
	1984	90.2(0.9)	88.9(1.2)	91.5(0.9)	91.7(0.9)	83.6(2.8)	85.5(2.9)
SPORT HISTORY: GENERAL	1990	81.9(2.0)	76.8(2.7)	87.2(2.2)	84.7(2.0)	72.8(5.1)	79.1(7.4)
	1988	76.1(2.2)	68.9(3.5)	83.3(2.2)	74.8(2.9)	75.5(5.5)	86.5(5.3)
	1984	79.8(0.8)	75.4(1.1)	84.3(1.0)	82.0(0.8)	71.6(3.8)	67.0(2.5)
SPORT HISTORY: ENGLISH	1990	67.9(1.5)	67.1(2.5)	68.8(2.3)	69.6(1.8)	61.7(5.4)	64.2(7.5)
	1988	56.9(2.5)	57.0(3.6)	56.9(3.5)	55.4(2.9)	55.1(4.1)	73.7(8.8)
	1984	62.6(1.5)	65.9(1.7)	59.2(2.1)	65.1(1.5)	52.3(3.6)	50.5(2.6)
SPORT HISTORY: CONTEMPORARY	1990	89.5(1.5)	90.5(2.1)	88.6(1.8)	92.7(1.5)	78.8(4.5)	82.9(7.2)
	1988	90.3(1.7)	91.0(2.3)	89.5(1.9)	91.2(2.1)	87.3(2.8)	87.0(5.6)
	1984	89.0(0.8)	90.1(1.0)	87.9(1.1)	92.1(0.8)	77.7(2.5)	77.5(5.0)
CIVICS: DOCUMENT DESCRIPTION	1990	48.8(1.8)	44.2(2.6)	53.5(2.8)	52.5(1.9)	34.4(4.5)	45.6(8.5)
	1988	46.2(1.9)	42.9(3.7)	49.6(2.6)	50.2(2.5)	32.3(5.1)	33.5(8.5)
	1984	46.8(1.4)	43.3(2.1)	50.4(1.7)	50.4(1.4)	34.2(3.2)	32.0(4.1)
CIVICS: IMPORTANCE OF COURT	1990	62.5(1.8)	63.1(3.2)	61.9(3.2)	66.4(2.0)	47.9(4.8)	51.9(8.5)
	1988	62.7(3.1)	63.6(3.8)	61.8(3.0)	63.5(4.0)	53.4(4.4)	75.3(6.5)
	1984	60.3(1.0)	60.2(1.6)	60.5(1.4)	60.9(1.1)	57.7(3.2)	56.0(5.3)
CIVICS: VOCABULARY	1990	21.3(1.5)	19.7(2.0)	23.0(2.3)	24.6(1.7)	12.0(3.8)	9.3(3.6)
	1988	20.2(2.1)	20.6(3.3)	19.9(3.4)	21.2(2.5)	14.5(4.1)	15.2(4.4)
	1984	22.3(1.2)	23.5(1.6)	21.0(1.4)	25.2(1.5)	9.8(1.7)	12.5(2.5)
U.S. HISTORY: TRANSPORTATION	1990	92.1(1.3)	89.4(2.0)	95.0(1.3)	93.3(1.1)	87.4(4.0)	91.9(5.0)
	1988	91.7(1.5)	91.9(1.8)	91.4(2.7)	93.3(1.8)	89.6(4.2)	76.9(6.4)
	1984	93.6(0.7)	92.4(0.8)	94.8(0.8)	95.1(0.7)	88.8(1.7)	85.2(3.2)
U.S. HISTORY: VOCABULARY	1990	86.8(1.8)	88.9(2.5)	84.7(2.1)	88.9(1.6)	78.3(5.7)	87.5(6.8)
	1988	88.6(1.4)	88.2(2.5)	89.1(2.1)	89.9(1.4)	82.3(3.7)	86.5(5.4)
	1984	88.5(0.8)	88.5(1.2)	88.5(0.9)	90.5(0.9)	80.9(2.3)	77.7(3.2)
SUMMER JOB: APPLY FOR SS CARD	1990	91.4(1.4)	88.7(2.0)	94.2(1.5)	92.5(1.6)	84.1(4.2)	92.8(4.2)
	1988	93.5(1.2)	90.3(2.2)	96.7(1.1)	95.0(1.4)	91.2(2.8)	75.1(5.8)
	1984	91.2(0.8)	88.1(1.1)	94.5(0.8)	92.6(0.7)	86.0(1.9)	86.2(3.8)
SUMMER JOB: WHEN TO LOOK	1990	81.5(1.6)	80.7(2.0)	82.4(2.3)	85.3(1.7)	76.5(4.4)	66.9(5.8)
	1988	82.9(1.8)	78.6(2.8)	87.1(2.0)	88.0(1.8)	68.2(5.0)	63.4(7.6)
	1984	85.1(0.8)	83.1(1.1)	87.2(1.1)	87.7(0.9)	76.5(2.4)	74.3(4.2)
SUMMER JOB: DOCUMENTS NEEDED	1990	74.4(1.5)	68.7(2.3)	80.5(2.6)	78.2(1.8)	59.0(4.4)	67.4(6.4)
	1988	77.8(1.9)	75.5(2.5)	80.0(2.9)	82.0(1.7)	65.4(4.7)	60.3(***)
	1984	73.6(1.1)	72.0(1.8)	75.4(1.4)	76.4(1.3)	63.6(2.8)	63.8(3.6)
SUMMER JOB: JOB REFERENCES	1990	86.6(1.5)	83.9(2.1)	89.4(1.5)	88.7(1.4)	79.5(4.6)	87.1(4.8)
	1988	86.9(1.5)	83.6(2.4)	90.2(1.7)	89.2(1.6)	79.5(4.9)	75.8(8.6)
	1984	83.6(0.7)	80.7(1.2)	86.7(1.3)	86.4(0.9)	74.0(2.8)	71.0(2.8)
BOBBY STORY FACT	1990	89.2(1.4)	86.6(2.0)	92.1(1.5)	90.4(1.5)	87.7(3.6)	80.7(5.2)
	1988	87.7(1.7)	82.7(2.8)	92.7(1.5)	88.5(1.7)	85.2(4.5)	84.1(6.2)
	1984	87.7(0.7)	84.6(1.1)	91.0(0.9)	89.2(0.8)	82.4(2.0)	78.0(3.4)

NAEP 1990 READING TREND ASSESSMENT—AGE 17

Percentage of Students Responding Correctly to Reading Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
"LEARN TO READ": SAME MEANING	1990	91.2(1.4)	88.3(1.9)	94.3(1.3)	91.5(1.7)	91.5(3.1)	86.7(6.2)
	1988	93.0(1.3)	92.6(2.3)	93.5(1.6)	94.6(1.1)	86.4(5.4)	87.7(5.4)
	1984	90.7(0.6)	88.5(0.9)	93.0(0.9)	91.5(0.7)	88.7(1.8)	85.1(4.5)
COMPARISON OF CHARACTERISTICS	1990	82.2(1.6)	77.5(2.1)	87.2(2.4)	83.9(1.7)	79.9(4.9)	70.0(5.4)
	1988	75.7(2.1)	77.2(3.2)	74.0(2.4)	77.8(2.4)	67.5(3.7)	71.0(8.3)
	1984	79.8(0.8)	77.7(1.3)	82.2(1.1)	82.2(1.0)	70.5(2.7)	72.5(2.9)
STEPS IN PERFORMING A TRICK	1990	91.4(1.3)	88.6(1.9)	94.3(1.4)	91.3(1.4)	91.0(3.1)	89.7(3.7)
	1988	93.8(1.3)	90.6(2.6)	97.0(1.0)	95.6(1.0)	87.7(5.8)	83.1(6.6)
	1984	90.1(0.9)	86.6(1.3)	93.9(0.9)	91.1(1.0)	86.5(1.8)	87.0(3.8)
SETTING FOR A TRICK	1990	84.8(1.4)	81.9(2.1)	87.9(1.7)	86.8(1.6)	80.2(4.0)	73.9(5.5)
	1988	83.8(1.8)	82.0(2.5)	85.5(2.6)	85.4(2.2)	74.7(3.9)	82.2(6.8)
	1984	83.7(1.0)	81.3(1.6)	86.4(1.2)	85.6(1.2)	77.7(2.5)	74.6(4.4)
RESULT OF FOOD CHAIN	1990	85.9(1.2)	83.7(1.8)	88.2(1.8)	86.4(1.5)	80.0(5.0)	91.4(4.2)
	1988	80.3(1.6)	76.3(2.4)	84.1(2.6)	84.1(1.2)	70.4(6.0)	63.3(8.9)
	1984	82.0(0.9)	80.1(1.3)	83.9(1.2)	83.0(1.1)	79.3(3.8)	74.2(4.0)
FOOD CHAIN MAIN IDEA	1990	77.4(1.8)	76.4(2.8)	78.5(2.3)	79.7(2.1)	73.7(4.7)	64.3(7.6)
	1988	77.4(2.3)	77.1(3.4)	78.2(2.8)	81.3(2.6)	66.2(4.2)	67.7(***)
	1984	78.9(1.1)	79.1(1.9)	78.6(1.1)	81.2(1.4)	68.0(2.9)	67.3(3.9)
BEST TITLE FOR SCOTT STORY	1990	49.7(2.1)	45.9(2.9)	53.4(3.1)	52.7(2.2)	38.5(4.3)	41.9(9.6)
	1988	52.1(2.8)	49.2(4.9)	54.4(2.9)	51.4(3.4)	57.7(5.3)	41.6(7.9)
	1984	49.8(0.9)	48.9(1.4)	50.7(1.3)	51.4(1.2)	41.6(3.0)	42.6(2.7)
SCOTT STORY FACT	1990	73.2(1.8)	73.8(2.7)	72.6(2.5)	73.5(1.7)	72.2(6.2)	70.1(7.4)
	1988	76.5(2.2)	69.8(3.1)	82.3(2.3)	75.7(2.6)	81.9(5.3)	69.7(8.4)
	1984	73.7(0.9)	70.8(1.5)	76.9(1.2)	73.3(1.1)	75.3(2.3)	73.8(4.0)
SCOTT STORY DEFINITION	1990	38.9(1.8)	35.7(2.2)	42.1(2.9)	43.0(2.0)	21.1(4.1)	23.3(9.2)
	1988	37.6(3.5)	35.8(5.7)	39.3(3.1)	38.7(4.2)	32.7(4.9)	35.1(9.7)
	1984	37.6(0.9)	35.8(1.4)	39.6(1.3)	38.9(1.1)	32.0(2.7)	34.8(1.9)
WOMEN'S VOTE: CENTRAL PURPOSE	1990	81.8(1.7)	77.8(2.7)	85.8(1.9)	85.0(1.8)	62.6(5.3)	85.1(5.8)
	1988	83.3(1.4)	79.8(2.2)	86.4(2.1)	83.2(1.8)	79.7(3.4)	95.5(4.7)
	1984	79.9(1.0)	74.9(1.4)	85.2(1.3)	80.1(1.1)	80.1(2.7)	75.0(4.1)
WOMEN'S VOTE: VOCABULARY	1990	59.7(1.8)	56.5(2.5)	62.8(2.9)	62.1(2.3)	48.5(4.8)	56.0(7.1)
	1988	57.6(2.1)	54.3(2.5)	60.2(3.2)	57.0(2.5)	61.8(4.6)	53.6(8.1)
	1984	59.6(1.1)	57.7(1.7)	61.6(1.1)	59.6(1.2)	63.4(3.2)	49.9(4.3)
WOMEN'S VOTE: RECALL OF FACT	1990	64.5(2.0)	56.1(2.4)	72.7(2.7)	65.1(2.2)	59.3(4.8)	65.4(***)
	1988	67.6(3.3)	61.3(5.2)	73.5(2.9)	69.3(3.9)	59.6(5.8)	56.5(9.9)
	1984	66.0(1.2)	63.0(1.7)	69.2(1.5)	66.9(1.3)	65.1(2.6)	56.7(7.4)
WOMEN'S VOTE: WOMEN JOIN FIGHT	1990	76.5(1.8)	72.2(2.9)	80.6(2.3)	79.7(2.0)	67.6(5.1)	64.8(***)
	1988	77.7(1.7)	71.7(2.8)	83.0(2.4)	80.5(2.1)	64.5(4.7)	70.0(6.7)
	1984	74.8(1.2)	70.2(1.5)	79.8(1.5)	76.4(1.3)	68.6(3.5)	68.8(5.1)
WOMEN'S VOTE: WOMAN'S RESPONSE	1990	76.1(1.9)	67.2(2.4)	84.6(2.5)	79.3(1.8)	64.7(6.1)	66.3(7.3)
	1988	77.0(2.2)	71.3(3.8)	82.0(2.8)	79.0(2.5)	64.8(5.4)	73.8(***)
	1984	75.5(1.1)	66.4(1.7)	85.2(1.4)	77.4(1.4)	65.9(2.4)	69.8(3.4)
WOMEN'S VOTE: NATIONAL SUPPORT	1990	67.5(2.1)	64.4(2.9)	70.4(2.9)	72.1(2.1)	48.5(5.5)	58.9(9.4)
	1988	71.5(1.2)	64.2(2.9)	78.2(1.7)	71.1(1.2)	71.3(4.5)	76.6(7.5)
	1984	66.2(1.1)	63.2(1.6)	69.4(1.7)	68.1(1.3)	57.8(2.9)	57.3(3.0)

NAEP 1990 READING TREND ASSESSMENT—AGE 17

Percentage of Students Responding Correctly to Reading Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
FACT ABOUT PET CARE	1990	73.1(1.4)	68.4(2.5)	77.5(2.3)	80.5(1.4)	52.8(5.2)	38.9(6.6)
	1988	76.7(2.1)	68.6(3.4)	83.8(2.4)	78.7(2.2)	69.8(3.7)	67.2(***)
	1984	77.6(1.2)	74.0(1.9)	81.4(1.5)	81.5(1.3)	61.9(3.7)	54.6(5.3)
FACT ABOUT HEALTH OF PET	1990	69.5(1.8)	63.4(2.7)	75.2(2.1)	74.3(1.7)	53.5(5.4)	61.0(6.8)
	1988	74.3(2.1)	72.6(3.5)	75.6(2.8)	78.4(2.1)	53.1(7.4)	72.8(7.0)
	1984	72.6(1.2)	71.0(2.0)	74.2(1.6)	76.8(1.3)	52.4(3.4)	57.1(5.5)
SPORT: MAIN REASON	1990	77.6(1.9)	73.6(2.6)	81.3(2.4)	81.4(1.9)	55.3(6.6)	74.4(6.8)
	1988	73.3(2.5)	73.7(4.3)	72.8(2.3)	76.7(2.8)	54.6(5.6)	62.2(5.5)
	1984	72.9(1.2)	69.3(1.4)	76.7(1.7)	75.8(1.3)	57.3(3.3)	57.3(6.3)
SURVIVE CLIMB: CONDITIONS	1990	74.2(1.9)	73.2(2.3)	75.2(2.7)	78.4(1.9)	61.2(4.8)	64.2(***)
	1988	79.6(1.5)	81.4(2.3)	78.4(2.2)	83.3(1.7)	76.6(4.1)	44.8(6.2)
	1984	71.9(0.9)	73.3(1.5)	70.4(1.7)	75.0(1.0)	61.5(4.0)	57.7(3.1)
SURVIVE CLIMB: CHARACTER ROLE	1990	63.3(1.9)	58.8(2.7)	67.7(2.7)	67.0(2.0)	48.7(5.0)	48.1(9.5)
	1988	62.6(1.9)	54.5(3.1)	69.6(2.8)	63.0(2.1)	65.1(4.1)	62.4(8.3)
	1984	60.1(1.1)	53.6(1.2)	66.9(1.7)	62.2(1.4)	49.6(3.5)	55.9(3.4)
SURVIVE CLIMB: CHARACTER TRAIT	1990	75.7(1.8)	76.6(2.4)	74.8(2.5)	79.1(2.1)	63.1(4.8)	71.6(6.8)
	1988	79.4(1.9)	81.0(2.7)	77.9(3.1)	82.7(2.2)	74.4(5.3)	47.7(5.3)
	1984	74.7(1.3)	73.8(1.8)	75.6(1.7)	77.8(1.3)	64.0(3.6)	57.5(4.4)
SURVIVE CLIMB: RESOLUTION	1990	74.8(1.8)	69.9(2.4)	79.7(2.3)	78.0(2.2)	60.2(5.0)	79.6(9.3)
	1988	74.9(1.9)	67.7(2.8)	81.5(2.6)	77.9(2.1)	68.5(4.0)	58.3(6.7)
	1984	75.2(1.0)	69.5(1.3)	81.2(1.4)	77.7(1.1)	64.8(2.4)	67.0(4.7)
PHONE DOCUMENT FOR NEW YORK	1990	71.3(2.0)	71.1(2.9)	71.5(2.3)	72.7(2.3)	59.6(7.2)	73.3(9.1)
	1988	74.7(2.2)	75.4(3.1)	74.4(2.8)	77.9(2.4)	62.5(4.8)	63.8(7.6)
	1984	69.9(1.1)	68.8(1.6)	71.0(1.7)	72.2(1.2)	57.2(3.4)	66.8(4.8)
PHONE DOCUMENT FOR SYRACUSE	1990	84.6(1.3)	86.0(2.0)	83.3(1.8)	87.0(1.4)	78.2(4.1)	80.4(7.3)
	1988	87.1(2.1)	88.9(2.4)	85.5(2.6)	88.4(2.0)	88.6(4.2)	74.8(7.5)
	1984	84.8(0.8)	82.5(1.2)	87.3(1.2)	85.8(1.0)	78.7(2.7)	84.2(2.6)
TIRESOME JOBS - 1900'S	1990	66.6(1.7)	64.4(2.5)	68.9(2.6)	71.2(2.0)	47.3(5.3)	71.7(***)
	1988	68.9(2.4)	63.8(2.5)	73.7(3.8)	69.6(3.1)	64.1(4.5)	66.9(6.5)
	1984	70.4(1.0)	66.2(1.8)	74.9(1.3)	73.0(1.2)	58.3(3.4)	62.5(6.7)
JOBS IN THE WOODS - 1900'S	1990	81.6(1.5)	79.3(2.0)	83.8(2.1)	84.0(1.7)	72.2(4.1)	79.3(9.6)
	1988	82.6(1.4)	81.9(2.2)	83.3(2.4)	84.9(1.6)	73.3(4.2)	78.3(5.3)
	1984	79.5(1.1)	73.3(1.9)	85.8(1.2)	81.8(1.3)	66.9(3.0)	75.0(4.9)
HOME JOBS - 1900'S	1990	88.1(1.1)	81.7(2.1)	94.4(1.1)	89.8(1.5)	81.0(3.3)	82.1(8.9)
	1988	89.0(1.7)	82.4(2.9)	94.7(1.3)	90.4(2.1)	84.7(3.8)	79.5(5.6)
	1984	87.7(0.8)	82.4(1.4)	93.2(0.8)	89.1(1.0)	80.2(3.4)	86.7(3.3)
HISTORY OF ARTS BEFORE 1940	1990	41.4(2.0)	41.6(2.9)	41.3(2.4)	47.0(2.2)	24.2(3.6)	21.9(6.5)
	1988	45.2(2.4)	47.1(3.0)	43.4(3.5)	49.7(3.0)	33.8(4.7)	16.1(7.1)
	1984	39.3(1.3)	39.1(1.5)	39.5(1.6)	41.8(1.5)	24.8(2.2)	38.1(6.0)
HISTORICAL PRIVILEGE OF ARTS	1990	48.4(2.0)	47.3(3.5)	49.5(2.7)	52.5(2.1)	32.0(5.5)	35.7(4.0)
	1988	51.9(2.8)	49.3(3.2)	54.2(3.9)	55.9(3.1)	40.9(5.0)	28.1(6.4)
	1984	50.8(1.4)	47.3(1.6)	54.3(1.7)	52.3(1.6)	41.8(2.7)	49.2(4.0)
MASS PRODUCTION OF ART	1990	28.8(1.8)	31.2(2.8)	26.5(2.2)	28.7(1.9)	24.0(5.8)	34.0(8.5)
	1988	28.4(2.0)	23.2(3.6)	32.9(3.1)	28.8(2.0)	25.8(5.4)	24.7(6.9)
	1984	31.4(1.0)	28.3(1.4)	34.5(1.5)	32.3(1.3)	27.7(2.4)	25.7(8.3)
HISTORY OF GOLD RUSH FACT	1990	79.6(1.5)	79.0(2.1)	80.2(2.2)	84.0(1.6)	62.2(5.4)	69.3(5.8)
	1988	73.5(1.9)	67.7(3.1)	78.6(3.1)	74.8(2.1)	71.9(4.0)	61.1(9.9)
	1984	71.7(1.3)	66.4(1.8)	77.3(1.5)	75.2(1.2)	62.0(3.0)	50.3(7.1)

NAEP 1990 READING TREND ASSESSMENT—AGE 17

Percentage of Students Responding Correctly to Reading Trend Items (continued)

ITEM DESCRIPTION	YEAR	NATION	MALE	FEMALE	WHITE	BLACK	HISPANIC
TRAFFIC VIOLATION FACT	1990	76.5(1.7)	73.8(2.3)	79.0(2.7)	76.4(1.9)	75.2(5.3)	73.4(4.8)
	1988	76.0(1.8)	74.1(2.9)	77.6(2.8)	78.0(2.3)	64.6(4.6)	77.4(6.6)
	1984	74.5(1.2)	73.6(1.4)	75.5(1.8)	77.2(1.3)	63.2(2.9)	67.9(3.2)
COST OF TRAFFIC FINE	1990	64.7(2.4)	65.9(3.3)	63.5(3.3)	71.3(2.5)	43.3(5.2)	44.5(7.0)
	1988	60.3(2.6)	63.5(4.5)	57.5(3.9)	64.9(2.9)	47.0(7.3)	33.1(***)
	1984	64.8(1.6)	64.5(1.9)	65.0(1.9)	68.4(1.7)	50.6(3.9)	51.9(6.5)
TRAFFIC FINE PAYMENT FACT	1990	49.3(1.9)	47.7(2.5)	50.8(3.0)	49.3(2.2)	43.4(4.2)	60.2(6.0)
	1988	46.7(2.1)	44.6(3.1)	48.4(3.6)	48.9(3.0)	41.1(4.4)	30.8(***)
	1984	43.9(1.3)	43.9(2.2)	43.9(1.3)	47.0(1.6)	28.7(1.9)	40.5(5.3)
FROZEN PIZZA: REASON PRODUCED	1990	74.5(1.8)	74.0(2.5)	75.0(2.2)	78.4(1.9)	60.2(5.3)	63.9(7.8)
	1988	71.2(2.2)	68.2(3.8)	73.8(3.1)	73.7(2.5)	65.5(4.4)	54.8(***)
	1984	72.4(1.4)	69.0(1.8)	75.9(1.6)	74.8(1.6)	64.6(3.2)	57.3(4.7)
FROZEN PIZZA: MIDDLE STAGE	1990	68.9(1.7)	65.6(3.0)	72.2(2.5)	71.0(2.0)	62.4(4.6)	59.5(5.5)
	1988	68.1(2.6)	61.7(4.0)	73.5(2.9)	71.9(3.1)	59.0(7.1)	38.3(7.4)
	1984	63.6(1.4)	58.9(2.1)	68.5(1.6)	65.6(1.7)	54.5(4.1)	55.0(6.5)
FROZEN PIZZA: INGREDIENTS USED	1990	53.4(2.1)	49.4(3.4)	57.4(2.7)	55.7(2.4)	45.0(5.6)	43.7(5.0)
	1988	50.7(2.7)	47.9(3.3)	53.0(4.0)	52.7(3.5)	48.0(5.8)	26.1(6.6)
	1984	45.3(1.2)	38.5(1.6)	52.2(1.7)	48.4(1.3)	31.0(3.8)	25.5(2.9)
PURPOSE OF BUSINESS ARTICLE	1990	69.8(1.6)	71.1(2.4)	68.4(2.5)	71.3(1.8)	63.4(4.5)	73.6(5.7)
	1988	72.5(2.6)	72.8(3.1)	72.1(3.2)	75.7(3.0)	57.5(6.0)	71.1(6.2)
	1984	66.2(0.8)	62.8(1.3)	69.6(1.2)	69.4(0.9)	54.2(2.4)	52.3(2.6)
IDENTIFY BUSINESS LIABILITY	1990	62.8(1.8)	60.0(2.7)	65.7(2.4)	64.4(2.0)	58.2(4.7)	53.4(8.7)
	1988	65.4(2.4)	64.8(2.5)	66.2(3.3)	69.5(2.9)	57.6(5.1)	39.2(8.9)
	1984	63.7(1.1)	61.1(0.9)	66.5(2.0)	68.5(1.2)	47.6(2.8)	46.2(2.6)
DEFINE BUSINESS PROFIT	1990	93.4(0.9)	92.4(1.4)	94.5(1.4)	93.7(1.1)	95.0(2.4)	86.2(6.7)
	1988	95.2(1.0)	96.0(1.3)	94.4(1.6)	96.4(1.1)	90.5(3.0)	91.5(5.0)
	1984	93.2(0.4)	92.4(0.8)	93.9(0.7)	95.0(0.5)	87.1(2.0)	86.9(1.9)
SIOUX STORY: AUTHOR'S VIEW	1990	64.2(2.3)	61.2(3.3)	67.2(3.1)	66.2(2.0)	55.3(6.1)	65.5(***)
	1988	69.1(2.4)	73.6(4.1)	65.2(2.7)	70.7(2.8)	70.4(3.9)	47.4(8.1)
	1984	69.5(0.8)	69.8(1.0)	69.1(1.1)	73.0(0.9)	53.1(2.1)	65.5(2.3)
SIOUX STORY: INFERENCE	1990	61.2(2.0)	62.7(3.1)	59.7(3.0)	65.9(2.2)	39.0(5.3)	63.9(9.5)
	1988	66.9(2.1)	71.0(3.4)	63.2(3.3)	71.4(2.2)	49.5(5.5)	59.4(7.6)
	1984	67.4(1.2)	68.8(1.2)	66.1(1.6)	72.3(1.2)	47.2(2.4)	54.0(5.1)
SIOUX STORY: MAJOR EVENT	1990	61.0(2.1)	59.7(2.8)	62.4(3.2)	66.8(2.1)	39.1(5.6)	51.3(***)
	1988	62.5(2.4)	63.7(3.1)	61.7(3.7)	68.2(2.7)	44.8(4.9)	42.7(8.3)
	1984	63.4(1.0)	64.1(1.3)	62.6(1.5)	67.5(1.1)	43.0(3.2)	56.4(5.7)
SIOUX STORY: MAIN PURPOSE	1990	70.7(2.0)	66.8(3.2)	74.7(2.5)	73.6(2.2)	57.1(4.1)	72.6(8.8)
	1988	70.5(2.2)	74.8(3.5)	66.8(3.3)	75.1(2.4)	55.4(5.8)	50.9(6.6)
	1984	71.8(0.9)	72.2(1.2)	71.4(1.2)	76.4(0.8)	51.5(3.1)	57.3(4.4)

DATA APPENDIX

WRITING

NAEP 1990 NATIONAL WRITING TREND ASSESSMENT— GRADE 4

Average Writing Achievement Across Assessment Years

	1984	1988	1990
-- TOTAL --	179.4(2.2)	185.5(1.8)	183.3(1.5)
SEX			
MALE	175.6(3.0)	175.9(2.8)	173.6(1.6)
FEMALE	183.6(2.6)	194.9(1.8)	192.5(2.2)
RACE/ETHNICITY			
WHITE	186.4(2.6)	193.2(2.1)	190.9(1.6)
BLACK	154.3(4.3)	154.3(3.6)	155.0(4.8)
HISPANIC	162.6(3.5)	169.1(4.4)	167.8(3.4)
OTHER	183.4(6.4)	189.1(9.2)	188.7(4.7)
REGION			
NORTHEAST	186.0(5.3)	187.3(5.2)	191.4(3.2)
SOUTHEAST	179.4(4.0)	180.7(3.5)	175.5(4.7)
CENTRAL	175.8(3.8)	189.9(2.3)	184.5(2.4)
WEST	177.3(3.3)	184.7(3.7)	182.6(3.0)
TYPE OF COMMUNITY			
EXTREME RURAL	154.0(10.9)	185.2(4.8)	186.2(4.8)
DISADVANTAGED URBAN	167.0(4.1)	158.0(4.8)	158.6(6.8)
ADVANTAGED URBAN	197.1(3.8)	199.2(6.1)	195.3(4.8)
OTHER	180.1(2.8)	186.1(2.4)	184.4(1.9)
PARENTS' EDUCATION LEVEL			
NOT GRADUATED H.S.	156.9(6.0)	157.8(8.4)	169.1(4.9)
GRADUATED H.S.	171.2(4.6)	183.3(3.2)	183.0(2.8)
POST H.S.	186.5(5.5)	178.6(6.6)	194.5(5.9)
GRADUATED COLLEGE	192.6(2.2)	194.9(2.2)	191.3(1.5)
DO NOT KNOW	175.9(3.3)	178.7(3.2)	174.4(2.2)
TYPE OF SCHOOL			
PUBLIC	177.5(2.4)	184.3(1.7)	181.9(1.7)
PRIVATE	190.7(4.7)	193.6(6.3)	198.6(3.8)

NAEP 1990 NATIONAL WRITING TREND ASSESSMENT— GRADE 8

Average Writing Achievement Across Assessment Years

	1984	1988	1990
-- TOTAL --	206.3(1.4)	202.8(1.3)	197.8(1.3)
SEX			
MALE	198.8(1.8)	192.8(2.1)	186.8(1.6)
FEMALE	214.1(1.9)	212.5(1.4)	208.3(1.5)
RACE/ETHNICITY			
WHITE	210.2(1.6)	207.2(1.3)	202.3(1.5)
BLACK	189.7(3.6)	189.5(3.4)	182.1(2.8)
HISPANIC	190.9(5.7)	187.5(3.8)	189.0(3.0)
OTHER	215.1(5.3)	210.6(3.8)	195.4(4.1)
REGION			
NORTHEAST	213.2(3.3)	204.0(1.8)	201.4(2.2)
SOUTHEAST	207.1(2.8)	207.6(3.3)	194.0(2.5)
CENTRAL	201.5(3.0)	197.1(3.5)	200.7(3.8)
WEST	204.4(3.0)	203.2(2.2)	195.7(2.4)
TYPE OF COMMUNITY			
EXTREME RURAL	202.7(4.8)	204.5(5.6)	200.0(5.4)
DISADVANTAGED URBAN	192.6(4.3)	188.8(2.7)	189.1(3.2)
ADVANTAGED URBAN	222.4(5.7)	208.2(3.0)	216.7(3.5)
OTHER	205.6(1.6)	202.9(1.8)	195.4(1.7)
PARENTS' EDUCATION LEVEL			
NOT GRADUATED H.S.	196.4(4.5)	194.5(3.9)	191.7(3.7)
GRADUATED H.S	203.0(2.6)	198.3(2.2)	195.1(1.9)
POST H.S.	210.0(5.2)	213.4(3.2)	206.9(2.7)
GRADUATED COLLEGE	215.2(2.7)	207.8(2.3)	203.4(2.0)
DO NOT KNOW	191.1(3.8)	187.0(3.7)	177.1(3.0)
TYPE OF SCHOOL			
PUBLIC	204.3(1.5)	201.2(1.6)	195.2(1.3)
PRIVATE	219.8(3.2)	214.9(2.4)	215.4(3.7)

NAEP 1990 NATIONAL WRITING TREND ASSESSMENT—GRADE 11

Average Writing Achievement Across Assessment Years

	1984	1988	1990
-- TOTAL --	212.2(1.7)	214.3(1.4)	211.5(1.3)
SEX			
MALE	201.3(2.7)	203.5(1.9)	199.8(2.0)
FEMALE	223.3(2.0)	223.4(1.6)	223.7(1.4)
RACE/ETHNICITY			
WHITE	218.0(2.2)	218.6(1.6)	216.9(1.5)
BLACK	195.2(4.4)	199.5(2.8)	193.7(2.3)
HISPANIC	187.8(3.9)	198.8(4.2)	197.6(3.9)
OTHER	212.4(9.3)	218.9(6.8)	210.0(4.4)
REGION			
NORTHEAST	214.7(2.2)	218.4(2.7)	219.7(2.9)
SOUTHEAST	210.9(3.9)	214.3(2.8)	205.6(2.9)
CENTRAL	213.3(4.0)	215.7(2.0)	212.0(2.5)
WEST	209.5(3.8)	209.6(3.2)	209.4(2.4)
TYPE OF COMMUNITY			
EXTREME	205.9(8.3)	214.6(3.6)	210.8(4.9)
DISADVANTAGED URBAN	193.9(4.4)	176.7(1.7)	196.4(4.4)
ADVANTAGED URBAN	219.7(4.7)	216.3(3.7)	221.1(5.2)
OTHER	213.8(1.8)	214.4(1.5)	212.0(1.4)
PARENTS' EDUCATION LEVEL			
NOT GRADUATED H.S.	199.7(4.0)	202.4(3.7)	190.2(3.3)
GRADUATED H.S.	207.2(2.4)	210.7(1.4)	204.8(2.3)
POST H.S.	218.1(4.5)	217.1(2.4)	215.1(2.3)
GRADUATED COLLEGE	220.2(3.0)	220.3(2.1)	221.3(1.8)
DO NOT KNOW	193.7(7.9)	180.7(6.3)	180.7(5.8)
TYPE OF SCHOOL			
PUBLIC	210.3(1.8)	213.1(1.5)	210.2(1.3)
PRIVATE	227.8(4.7)	221.7(3.2)	226.9(8.3)

NAEP 1990 WRITING TREND ASSESSMENT—GRADE 4

Percentages of Students At Each Score Point, Means, and Standard Errors for Items Scored by Primary Trait and Holistic Methods

PRIMARY TRAIT	Not Rated	Unsatis-factory	Minimal	Adequate	Elaborated	Minimal or Better	Adequate or Better		
Plants	(0)	(1)	(2)	(3)	(4)	(2,3,4)	(3,4)		Mean
1984	1.4 (0.4)	14.7 (1.4)	43.8 (2.3)	40.0 (2.2)		83.9 (1.6)	-		2.22 (0.03)
1988	1.3 (0.6)	16.0 (1.4)	42.5 (1.6)	40.2 (1.8)	[Not Applicable]	82.7 (1.7)	-		2.22 (0.03)
1990	0.8 (0.2)	23.3 (1.5)	39.3 (1.6)	36.7 (1.7)		75.9 (1.5)	-		2.12 (0.03)
XYZ Company	(0)	(1)	(2)	(3)	(4)	(2,3,4)	(3,4)		Mean
1984	3.8 (1.2)	50.1 (2.6)	8.6 (1.2)	37.5 (2.3)		46.1 (2.4)	-		1.80 (0.05)
1988	2.8 (0.4)	52.8 (1.8)	8.7 (0.9)	35.6 (1.9)	[Not Applicable]	44.3 (1.8)	-		1.77 (0.04)
1990	1.7 (0.4)	55.4 (1.5)	4.4 (0.6)	38.5 (1.5)		42.9 (1.4)	-		1.80 (0.03)
Spaceship	(0)	(1)	(2)	(3)	(4)	(2,3,4)	(3,4)		Mean
1984	6.9 (1.1)	30.0 (1.8)	43.1 (2.2)	19.7 (1.4)	0.3 (0.2)	63.1 (2.2)	20.0 (1.4)		1.77 (0.04)
1988	5.2 (0.6)	33.2 (1.3)	36.7 (1.6)	23.7 (1.7)	1.2 (0.4)	61.6 (1.1)	24.9 (1.7)		1.82 (0.02)
1990	2.8 (0.5)	31.1 (1.6)	42.1 (1.6)	23.3 (1.4)	0.6 (0.2)	66.1 (1.5)	24.0 (1.4)		1.88 (0.03)
Radio Station	(0)	(1)	(2)	(3)	(4)	(2,3,4)	(3,4)		Mean
1984	6.9 (1.0)	50.0 (1.9)	31.7 (2.2)	11.3 (1.6)	0.1 (0.1)	43.1 (2.0)	11.4 (1.6)		1.48 (0.03)
1988	4.8 (0.7)	46.6 (1.4)	33.5 (1.3)	15.1 (1.2)	0.0 (0.0)	48.6 (1.6)	15.1 (1.2)		1.59 (0.03)
1990	2.3 (0.5)	49.7 (1.8)	35.1 (1.6)	12.6 (1.0)	0.2 (0.2)	47.9 (1.8)	12.8 (1.1)		1.59 (0.03)
Appleby House	(0)	(1)	(2)	(3)	(4)	(2,3,4)	(3,4)		Mean
1984	4.3 (1.1)	28.7 (2.1)	50.8 (2.2)	16.2 (1.3)	0.0 (0.0)	67.0 (2.5)	16.2 (1.3)		1.79 (0.04)
1988	2.2 (0.6)	24.6 (1.3)	49.5 (1.4)	23.7 (1.7)	0.0 (0.0)	73.2 (1.1)	23.7 (1.7)		1.95 (0.02)
1990	1.8 (0.5)	22.4 (1.3)	63.9 (1.7)	11.7 (1.1)	0.2 (0.1)	75.7 (1.3)	11.8 (1.1)		1.86 (0.02)
Flashlight	(0)	(1)	(2)	(3)	(4)	(2,3,4)	(3,4)		Mean
1984	0.9 (0.3)	35.9 (2.3)	54.6 (2.0)	8.5 (1.5)	0.1 (0.2)	63.2 (2.4)	8.6 (1.5)		1.71 (0.03)
1988	1.7 (0.6)	33.2 (2.5)	50.9 (2.5)	13.8 (2.0)	0.4 (0.4)	65.1 (2.7)	14.3 (2.0)		1.78 (0.04)
1990	2.1 (0.7)	32.3 (2.6)	53.8 (2.5)	11.2 (1.4)	0.6 (0.3)	65.6 (2.6)	11.8 (1.5)		1.76 (0.04)
HOLISTIC									
Spaceship	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(4,5,6)	Mean
1984	4.0 (0.6)	10.4 (0.6)	31.4 (1.3)	34.7 (1.2)	15.2 (0.9)	3.0 (0.5)	1.2 (0.3)	19.4 (1.1)	2.61 (0.04)
1988	4.9 (0.6)	11.9 (1.1)	26.5 (1.8)	36.1 (1.6)	16.4 (1.2)	2.8 (0.6)	1.4 (0.3)	20.7 (1.3)	2.61 (0.04)
1990	2.5 (0.4)	10.1 (0.9)	30.3 (1.6)	36.7 (1.4)	15.8 (1.3)	3.9 (0.6)	0.7 (0.2)	20.4 (1.6)	2.68 (0.04)
Flashlight	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(4,5,6)	Mean
1984	0.6 (0.2)	13.9 (0.9)	30.7 (1.1)	28.8 (1.2)	15.7 (1.1)	7.4 (0.7)	3.0 (0.4)	26.1 (1.5)	2.79 (0.04)
1988	1.3 (0.5)	9.7 (1.2)	29.6 (1.9)	26.5 (1.8)	18.1 (2.1)	10.1 (1.5)	4.7 (0.9)	32.9 (2.6)	3.00 (0.07)
1980	1.7 (0.6)	15.2 (1.8)	27.0 (1.9)	29.2 (2.0)	17.2 (1.6)	7.4 (0.9)	2.3 (0.5)	26.9 (1.9)	2.76 (0.07)

NAEP 1990 WRITING TREND ASSESSMENT—GRADE 8

Percentages of Students At Each Score Point, Means, and Standard Errors for Items Scored by Primary Trait and Holistic Methods

PRIMARY TRAIT	**Not Rated**	**Unsatisfactory**	**Minimal**	**Adequate**	**Elaborated**	**Minimal or Better**	**Adequate or Better**		
Recreation Opportunity	(0)	(1)	(2)	(3)	(4)	(2,3,4)	(3,4)		**Mean**
1984	2.2 (0.7)	47.6 (2.5)	40.5 (2.6)	9.6 (1.4)	0.2 (0.2)	50.2 (2.7)	9.7 (1.4)		1.58 (0.04)
1988	3.1 (0.6)	52.3 (1.7)	37.4 (1.2)	7.2 (0.9)	0.1 (0.1)	44.6 (1.7)	7.2 (0.9)		1.49 (0.02)
1990	1.3 (0.4)	59.4 (1.9)	30.2 (1.6)	8.5 (0.9)	0.6 (0.2)	39.3 (1.9)	9.1 (1.0)		1.48 (0.03)
Food On The Frontier	(0)	(1)	(2)	(3)	(4)	(2,3,4)	(3,4)		**Mean**
1984	0.8 (0.4)	19.2 (1.8)	71.3 (1.7)	8.5 (1.4)	0.2 (0.1)	80.0 (1.9)	8.7 (1.4)		1.88 (0.03)
1988	0.6 (0.3)	20.9 (1.7)	65.7 (1.8)	12.5 (1.3)	0.3 (0.1)	78.5 (1.7)	12.8 (1.3)		1.91 (0.03)
1990	1.4 (0.4)	30.1 (1.2)	52.3 (1.3)	15.7 (1.1)	0.4 (0.2)	68.5 (1.2)	16.1 (1.1)		1.84 (0.02)
Dissecting Frogs	(0)	(1)	(2)	(3)	(4)	(2,3,4)	(3,4)		**Mean**
1984	1.0 (0.4)	14.4 (1.4)	73.9 (1.8)	10.4 (1.2)	0.2 (0.2)	84.6 (1.4)	10.6 (1.2)		1.94 (0.02)
1988	0.8 (0.2)	16.9 (1.7)	65.9 (1.9)	15.9 (1.1)	0.4 (0.2)	82.2 (1.7)	16.3 (1.1)		1.98 (0.02)
1990	1.2 (0.3)	23.7 (1.2)	63.3 (1.3)	11.2 (0.9)	0.6 (0.2)	75.1 (1.2)	11.8 (0.9)		1.86 (0.02)
XYZ Company	(0)	(1)	(2)	(3)	(4)	(2,3,4)	(3,4)		**Mean**
1984	0.0 (0.0)	15.7 (1.4)	11.9 (1.5)	72.5 (1.9)	[Not Applicable]	84.3 (1.4)	-		2.57 (0.03)
1988	0.3 (0.2)	21.4 (1.4)	7.5 (0.8)	70.7 (1.4)		78.3 (1.4)	-		2.49 (0.03)
1990	0.3 (0.1)	22.6 (1.4)	7.1 (0.6)	70.1 (1.4)		77.2 (1.4)	-		2.47 (0.03)
Radio Station	(0)	(1)	(2)	(3)	(4)	(2,3,4)	(3,4)		**Mean**
1984	0.2 (0.2)	27.2 (1.7)	41.8 (1.8)	30.2 (1.9)	0.6 (0.2)	72.6 (1.7)	30.7 (1.9)		2.04 (0.03)
1988	0.6 (0.2)	33.4 (1.5)	40.8 (1.6)	24.8 (1.0)	0.4 (0.2)	66.1 (1.5)	25.3 (1.0)		1.91 (0.02)
1990	0.7 (0.3)	34.1 (1.5)	40.7 (1.3)	23.5 (1.3)	1.1 (0.3)	65.2 (1.5)	24.5 (1.3)		1.90 (0.03)
Appleby House	(0)	(1)	(2)	(3)	(4)	(2,3,4)	(3,4)		**Mean**
1984	0.4 (0.3)	9.6 (1.5)	44.2 (2.4)	44.3 (2.4)	1.6 (0.5)	90.0 (1.5)	45.8 (2.4)		2.37 (0.03)
1988	0.3 (0.2)	10.2 (1.1)	40.9 (1.8)	47.4 (1.6)	1.3 (0.3)	89.5 (1.1)	48.7 (1.6)		2.39 (0.02)
1990	0.4 (0.2)	9.0 (0.8)	51.3 (1.5)	36.9 (1.5)	2.4 (0.5)	90.6 (0.8)	39.3 (1.5)		2.32 (0.02)

HOLISTIC									
Recreation Opportunity	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(4,5,6)	**Mean**
1984	1.4 (0.3)	5.5 (0.5)	20.7 (1.1)	42.6 (1.4)	22.4 (1.0)	6.2 (0.7)	1.2 (0.3)	29.8 (1.2)	3.02 (0.03)
1988	2.5 (0.4)	3.6 (0.6)	21.3 (1.0)	39.7 (1.3)	24.8 (1.4)	6.5 (0.7)	1.6 (0.4)	32.9 (1.8)	3.06 (0.04)
1990	1.1 (0.4)	4.5 (0.7)	19.9 (1.1)	40.8 (1.5)	23.2 (1.2)	8.0 (0.7)	2.5 (0.4)	33.7 (1.7)	3.14 (0.04)
Food On The Frontier	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(4,5,6)	**Mean**
1984	0.7 (0.2)	6.3 (0.6)	26.1 (1.1)	38.3 (0.8)	21.2 (0.8)	6.5 (0.5)	1.0 (0.3)	28.7 (1.0)	2.96 (0.03)
1988	0.3 (0.2)	7.7 (1.0)	26.1 (1.5)	35.8 (1.9)	22.1 (1.3)	6.2 (1.0)	1.7 (0.4)	30.1 (2.0)	2.97 (0.05)
1990	1.2 (0.4)	6.7 (0.9)	26.8 (1.3)	36.7 (1.5)	20.8 (1.2)	6.1 (0.7)	1.7 (0.5)	28.6 (1.5)	2.94 (0.04)

NAEP 1990 WRITING TREND ASSESSMENT—GRADE 11

Percentages of Students At Each Score Point, Means, and Standard Errors for Items Scored by Primary Trait and Holistic Methods

PRIMARY TRAIT	Not Rated	Unsatisfactory	Minimal	Adequate	Elaborated	Minimal or Better	Adequate or Better		
Recreation Opportunity	(0)	(1)	(2)	(3)	(4)	(2,3.4)	(3,4)		Mean
1984	0.6 (0.4)	26.0 (2.4)	56.8 (3.0)	16.3 (2.2)	0.3 (0.3)	73.5 (2.5)	16.6 (2.0)		1.90 (0.04)
1988	2.9 (0.4)	29.3 (1.6)	47.3 (1.5)	19.7 (1.7)	0.8 (0.2)	67.8 (1.6)	20.5 (1.7)		1.86 (0.03)
1990	1.3 (0.4)	33.0 (1.7)	45.2 (1.7)	19.5 (1.1)	0.9 (0.3)	65.7 (1.9)	20.4 (1.1)		1.86 (0.03)
Food On The Frontier	(0)	(1)	(2)	(3)	(4)	(2,3,4)	(3,4)		Mean
1984	1.6 (0.7)	13.6 (1.5)	71.4 (1.7)	12.8 (1.3)	0.6 (0.4)	84.8 (1.6)	13.4 (1.3)		1.97 (0.03)
1988	1.5 (0.4)	8.7 (1.2)	75.7 (1.6)	13.7 (1.1)	0.5 (0.2)	89.9 (1.2)	14.2 (1.2)		2.03 (0.02)
1990	1.1 (0.3)	17.3 (1.3)	63.1 (1.4)	17.8 (1.1)	0.7 (0.2)	81.6 (1.3)	18.5 (1.2)		2.00 (0.02)
Space Program	(0)	(1)	(2)	(3)	(4)	(2,3,4)	(3,4)		Mean
1984	5.8 (1.1)	14.6 (1.8)	54.7 (2.4)	23.6 (1.8)	1.3 (0.4)	79.6 (2.2)	24.8 (1.8)		2.00 (0.04)
1988	3.2 (0.5)	17.5 (1.5)	51.5 (2.0)	26.9 (1.6)	1.0 (0.3)	79.4 (1.6)	27.9 (1.6)		2.05 (0.03)
1990	4.4 (0.5)	13.6 (1.0)	54.3 (1.3)	26.5 (1.3)	1.2 (0.3)	81.9 (1.0)	27.6 (1.3)		2.06 (0.02)
Job Application	(0)	(1)	(2)	(3)	(4)	(2,3,4)	(3,4)		Mean
1984	1.4 (0.4)	14.4 (1.7)	16.2 (2.0)	65.4 (2.1)	2.7 (0.6)	84.3 (1.6)	68.0 (2.1)		2.54 (0.03)
1988	1.3 (0.4)	12.8 (0.8)	17.5 (1.4)	64.4 (1.9)	4.1 (0.9)	85.9 (1.0)	68.4 (1.7)		2.57 (0.03)
1990	1.3 (0.3)	14.4 (1.1)	16.8 (1.3)	66.6 (1.2)	1.0 (0.3)	84.3 (1.2)	67.5 (1.2)		2.52 (0.02)
Appleby House	(0)	(1)	(2)	(3)	(4)	(2,3,4)	(3,4)		Mean
1984	1.6 (0.5)	10.0 (1.3)	35.8 (2.0)	50.5 (1.7)	2.1 (0.7)	88.3 (1.3)	52.6 (1.9)		2.41 (0.03)
1988	0.8 (0.3)	8.9 (1.1)	37.0 (1.8)	52.0 (2.1)	1.3 (0.4)	90.3 (1.2)	53.3 (2.2)		2.44 (0.03)
1990	0.8 (0.3)	8.7 (0.9)	40.1 (1.7)	48.8 (1.7)	1.6 (0.4)	90.5 (0.9)	50.4 (1.7)		2.42 (0.02)
Bike Lane	(0)	(1)	(2)	(3)	(4)	(2,3,4)	(3,4)		Mean
1984	1.7 (0.5)	30.7 (1.8)	42.7 (2.7)	24.3 (2.1)	0.6 (0.3)	67.6 (1.7)	24.9 (2.1)		1.91 (0.03)
1988	0.9 (0.4)	29.7 (2.1)	48.1 (2.0)	21.0 (1.5)	0.3 (0.1)	69.4 (2.1)	21.4 (1.5)		1.90 (0.03)
1990	1.1 (0.3)	35.1 (1.2)	43.7 (1.2)	18.9 (0.9)	1.3 (0.4)	63.9 (1.2)	20.2 (1.0)		1.84 (0.02)
Food On The Frontier	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(4,5,6)	Mean
1984	0.8 (0.2)	3.5 (0.4)	16.5 (0.8)	38.1 (1.4)	28.1 (1.1)	9.7 (0.9)	3.4 (0.5)	41.2 (1.6)	3.32 (0.04)
1988	0.8 (0.3)	2.3 (0.5)	16.5 (1.4)	37.0 (1.9)	28.3 (1.7)	12.3 (0.9)	2.8 (0.5)	43.4 (2.1)	3.38 (0.04)
1990	1.0 (0.3)	2.2 (0.5)	17.6 (1.3)	37.9 (1.5)	26.7 (1.2)	11.8 (1.0)	2.8 (0.5)	41.3 (1.8)	3.34 (0.05)
Recreation Opportunity	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(4,5,6)	Mean
1984	0.8 (0.2)	2.5 (0.4)	14.4 (0.9)	39.4 (1.5)	27.7 (0.9)	12.0 (0.9)	3.3 (0.4)	42.9 (1.4)	3.40 (0.03)
1988	2.4 (0.4)	0.5 (0.2)	11.6 (1.1)	30.3 (1.8)	34.6 (2.2)	16.1 (1.4)	4.5 (0.8)	55.7 (2.0)	3.60 (0.04)
1990	0.5 (0.3)	2.0 (0.5)	14.5 (1.1)	36.2 (1.4)	29.3 (1.2)	12.8 (1.0)	4.7 (0.6)	46.8 (1.6)	3.49 (0.04)

NAEP 1990 NATIONAL WRITING TREND ASSESSMENT—GRADES 4, 8, AND 11

Trends in Overall Characteristics of Papers

			Percentiles			
		Year	**25th**	**50th**	**75th**	**90th**
Number of Words	**Grade 4**	**1990**	18.4	28.4	43.3	62.7
		1998	19.4	31.6	47.0	64.3
		1984	20.2	30.1	41.4	60.5
	Grade 8	**1990**	40.7	65.9	100.0	132.3
		1988	45.1	66.6	98.0	125.8
		1984	40.2	58.3	89.2	120.0
	Grade 11	**1990**	62.4	90.2	122.9	157.5
		1988	64.1	92.4	123.9	158.3
		1984	58.3	84.5	123.8	161.8
Word Length	**Grade 4**	**1990**	3.7	4.0	4.3	4.5
		1988	3.7	4.0	4.3	4.5
		1984	3.7	4.0	4.3	4.5
	Grade 8	**1990**	3.8	4.0	4.3	4.5
		1988	3.8	4.0	4.3	4.5
		1984	3.8	4.1	4.3	4.6
	Grade 11	**1990**	3.8	4.1	4.5	5.0
		1988	3.9	4.2	4.6	5.2
		1984	3.8	4.2	4.6	5.2
Number of Sentences	**Grade 4**	**1990**	1.1	2.0	3.6	5.1
		1988	1.3	2.3	3.7	5.0
		1984	1.3	2.2	3.4	4.8
	Grade 8	**1990**	2.7	4.4	6.4	9.2
		1988	2.7	4.4	6.8	8.8
		1984	2.3	3.9	5.9	8.2
	Grade 11	**1990**	3.8	5.4	7.6	9.5
		1988	3.8	5.5	7.4	9.7
		1984	3.4	5.2	7.3	9.9

NAEP 1990 NATIONAL WRITING TREND ASSESSMENT—GRADES 4, 8, AND 11

Trends in Overall Characteristics of Papers (continued)

Number of Words Per Sentence	**Grade 4**	**1990**	8.8	12.3	16.7	21.4
		1988	8.8	11.4	16.6	22.6
		1984	8.8	11.7	15.6	22.3
	Grade 8	**1990**	11.9	15.2	19.3	25.3
		1988	12.0	14.5	18.1	24.8
		1984	12.5	15.3	19.0	26.6
	Grade 11	**1990**	14.2	16.5	19.8	25.1
		1988	14.2	16.9	19.8	24.6
		1984	13.9	16.2	20.3	25.5
Number of Errors	**Grade 4**	**1990**	2.2	4.1	6.7	9.4
		1988	2.2	4.0	6.8	10.3
		1984	2.0	3.8	6.3	10.0
	Grade 8	**1990**	3.2	5.9	9.5	13.5
		1988	2.8	5.3	8.5	11.8
		1984	2.4	4.4	7.8	12.0
	Grade 11	**1990**	3.5	5.8	9.5	13.4
		1988	2.3	4.6	7.2	11.1
		1984	2.9	4.8	7.5	11.4
Error Rate	**Grade 4**	**1990**	8.1	14.8	22.9	32.9
		1988	7.5	13.2	21.0	35.0
		1984	7.3	13.4	20.6	30.5
	Grade 8	**1990**	5.5	9.1	13.4	19.3
		1988	4.6	8.2	13.5	18.1
		1984	4.5	7.5	12.2	17.7
	Grade 11	**1990**	4.2	6.7	9.4	13.4
		1988	2.8	4.9	8.1	11.9
		1984	3.4	5.9	9.5	13.7

NAEP 1990 NATIONAL WRITING TREND ASSESSMENT— GRADES 4, 8, AND 11

Trends in Sentence-Level Errors

			Percentiles			
		Year	25th	50th	75th	90th
Percentage run-on sentences	Grade 4	1990	0.0	0.2	16.9	99.7
		1988	0.0	0.2	24.7	67.2
		1984	0.0	0.2	20.4	50.3
	Grade 8	1990	0.0	0.2	0.5	33.2
		1988	0.0	0.1	0.4	29.1
		1984	0.0	0.1	0.5	25.1
	Grade 11	1990	0.0	0.1	0.4	17.3
		1988	0.0	0.1	0.4	12.0
		1984	0.0	0.1	0.4	19.9
Percentage sentence fragments	Grade 4	1990	0.0	0.1	0.3	17.2
		1988	0.0	0.1	0.4	24.6
		1984	0.0	0.1	0.3	0.5
	Grade 8	1990	0.0	0.1	0.4	17.0
		1988	0.0	0.1	0.4	14.1
		1984	0.0	0.1	0.4	14.2
	Grade 11	1990	0.0	0.1	0.4	10.9
		1988	0.0	0.1	0.4	11.5
		1984	0.0	0.1	0.4	12.5
Percentage sentences with agreement errors	Grade 4	1990	0.0	0.0	0.3	0.5
		1988	0.0	0.0	0.3	0.5
		1984	0.0	0.0	0.3	0.5
	Grade 8	1990	0.0	0.1	0.4	11.5
		1988	0.0	0.1	0.3	8.1
		1984	0.0	0.1	0.3	9.0
	Grade 11	1990	0.0	0.1	0.4	11.3
		1988	0.0	0.1	0.3	0.5
		1984	0.0	0.1	0.3	0.5
Percentage Awkward Sentences	Grade 4	1990	0.0	20.0	66.9	100.0
		1988	0.0	14.4	50.2	99.9
		1984	0.0	0.4	49.6	99.8
	Grade 8	1990	17.3	33.5	59.9	99.6
		1988	12.5	32.9	50.4	99.7
		1984	0.3	25.4	50.0	99.6
	Grade 11	1990	17.2	33.2	50.5	75.3
		1988	0.2	17.1	37.4	60.1
		1984	7.8	25.0	49.8	71.5

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Trends in Word-Level Errors

			Percentiles			
		Year	25th	50th	75th	90th
Percentage misspelled words	Grade 4	1990	2.5	6.5	13.9	20.5
		1988	2.4	6.4	12.0	22.5
		1984	2.2	6.7	12.0	18.1
	Grade 8	1990	0.9	2.9	5.5	9.9
		1988	0.7	2.8	5.7	9.2
		1984	0.4	2.7	5.1	9.0
	Grade 11	1990	0.6	1.9	3.6	6.4
		1988	0.2	1.3	2.8	4.6
		1984	0.4	1.5	3.3	5.9
Percentage word-choice errors	Grade 4	1990	0.0	0.1	0.4	2.1
		1988	0.0	0.1	0.4	2.2
		1984	0.0	0.1	0.4	3.0
	Grade 8	1990	0.0	0.2	0.8	2.1
		1988	0.0	0.2	0.9	2.4
		1984	0.0	0.2	0.9	2.4
	Grade 11	1990	0.0	0.3	1.0	1.8
		1988	0.0	0.2	0.9	2.0
		1984	0.0	0.3	1.0	2.0
Percentage capitalization errors	Grade 4	1990	0.0	0.1	0.4	1.8
		1988	0.0	0.1	0.3	0.5
		1984	0.0	0.5	0.3	0.5
	Grade 8	1990	0.0	0.1	0.3	0.7
		1988	0.0	0.1	0.3	0.5
		1984	0.0	0.1	0.3	0.5
	Grade 11	1990	0.0	0.04	0.3	0.5
		1988	0.0	0.02	0.3	0.4
		1984	0.0	0.03	0.3	0.5

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Trends in Punctuation Errors

			Percentiles			
		Year	**25th**	**50th**	**75th**	**90th**
Total punctuation errors per 100 words	**Grade 4**	**1990**	0.0	1.6	4.5	7.8
		1988	0.0	1.4	4.4	7.8
		1984	0.0	0.5	4.3	7.2
	Grade 8	**1990**	0.2	1.5	3.0	4.7
		1988	0.1	1.0	2.7	4.6
		1984	0.1	1.2	2.6	4.3
	Grade 11	**1990**	0.3	1.2	2.3	3.5
		1988	0.3	1.2	2.3	3.8
		1984	0.2	1.0	2.3	4.2
Punctuation omitted per 100 words	**Grade 4**	**1990**	0.0	0.7	4.4	7.8
		1988	0.0	0.7	4.1	7.4
		1984	0.0	0.4	3.8	6.9
	Grade 8	**1990**	0.1	1.0	2.5	4.3
		1988	0.0	0.5	2.1	4.0
		1984	0.0	0.5	2.0	3.8
	Grade 11	**1990**	0.1	0.9	1.9	3.1
		1988	0.1	0.7	1.9	3.1
		1984	0.0	0.6	1.9	3.6
Wrong punctuation per 100 words	**Grade 4**	**1990**	0.0	0.0	0.3	0.5
		1988	0.0	0.0	0.3	0.5
		1984	0.0	0.0	0.3	0.5
	Grade 8	**1990**	0.0	0.1	0.4	1.2
		1988	0.0	0.1	0.4	1.5
		1984	0.0	0.1	0.5	1.9
	Grade 11	**1990**	0.0	0.1	0.5	1.3
		1988	0.0	0.2	0.5	1.5
		1984	0.0	0.1	0.4	1.4

NAEP 1990 NATIONAL WRITING TREND ASSESSMENT—GRADES 4, 8, AND 11

Grammar, Punctutation, and Spelling: Trends in the Characteristics of Good and Poor Papers

			Task Accomplishment		Overall Fluency	
		Year	Good Papers (Primary Trait) 3+4	Bad Papers (Primary Trait) 1+2	Good Papers (Holistic) 4,5+6	Bad Papers (Holistic) 1,2+3
Number of Words	Grade 4	1990	53.3(2.3)	27.2(0.9)	52.5(2.1)	28.2(1.2)
		1988	51.4(4.2)	30.0(1.3)	63.9(3.8)	29.1(0.9)
		1984	48.4(2.1)	28.4(0.8)	58.0(2.4)	29.6(0.8)
	Grade 8	1990	126.0(9.7)	68.9(1.8)	115.9(3.6)	53.5(1.6)
		1988	109.4(8.0)	69.6(2.5)	97.3(2.5)	52.5(2.1)
		1984	91.9(4.3)	63.7(1.9)	99.8(3.3)	50.7(1.7)
	Grade 11	1990	140.3(4.5)	89.0(2.5)	132.3(3.7)	70.2(2.0)
		1988	131.9(5.2)	88.7(2.2)	116.5(2.3)	66.2(2.6)
		1984	134.5(7.1)	84.0(1.6)	116.2(4.3)	65.2(3.1)
Word Length	Grade 4	1990	4.0(0.0)	4.0(0.0)	4.0(0.0)	4.0(0.0)
		1988	4.0(0.0)	4.0(0.0)	4.0(0.0)	4.0(0.0)
		1984	4.0(0.0)	4.0(0.0)	4.0(0.0)	4.0(0.0)
	Grade 8	1990	4.2(0.0)	4.1(0.0)	4.2(0.0)	4.0(0.0)
		1988	4.2(0.1)	4.1(0.0)	4.1(0.0)	4.1(0.0)
		1984	4.2(0.0)	4.1(0.0)	4.2(0.0)	4.1(0.0)
	Grade 11	1990	4.4(0.0)	4.3(0.0)	4.3(0.0)	4.2(0.0)
		1988	4.4(0.0)	4.3(0.0)	4.4(0.0)	4.2(0.0)
		1984	4.4(0.1)	4.3(0.0)	4.4(0.0)	4.3(0.0)
Number of Sentences	Grade 4	1990	3.9(0.2)	2.1(0.1)	4.0(0.2)	2.1(0.1)
		1988	3.8(0.3)	2.3(0.2)	4.6(0.3)	2.2(0.1)
		1984	3.8(0.3)	2.2(0.1)	4.4(0.3)	2.3(0.1)
	Grade 8	1990	7.8(0.6)	4.6(0.1)	7.3(0.2)	3.7(0.1)
		1988	6.4(0.7)	4.8(0.2)	6.6(0.3)	3.7(0.2)
		1984	5.9(0.3)	4.2(0.1)	6.5(0.3)	3.4(0.2)
	Grade 11	1990	8.2(0.3)	5.4(0.2)	7.7(0.3)	4.4(0.1)
		1988	7.9(0.4)	5.3(0.2)	6.8(0.2)	4.2(0.2)
		1984	8.3(0.4)	5.0(0.1)	7.1(0.3)	3.8(0.2)

NAEP 1990 NATIONAL WRITING TREND ASSESSMENT—GRADES 4, 8, AND 11

Trends in the Characteristics of Good and Poor Papers (continued)

			Task Accomplishment		Overall Fluency	
		Year	Good Papers (Primary Trait) 3+4	Bad Papers (Primary Trait) 1+2	Good Papers (Holistic) 4,5+6	Bad Papers (Holistic) 1,2+3
Number of Words per Sentence	Grade 4	1990	17.9(1.2)	15.4(0.5)	16.3(1.2)	16.0(0.7)
		1988	15.9(1.4)	14.9(0.7)	15.6(1.4)	15.3(0.7)
		1984	16.0(0.7)	14.7(0.4)	15.7(1.0)	14.9(0.4)
	Grade 8	1990	17.0(0.9)	16.6(0.3)	16.8(0.5)	16.5(0.4)
		1988	20.2(2.7)	16.7(0.5)	16.6(0.6)	17.1(0.4)
		1984	16.7(0.8)	17.4(0.4)	16.7(0.7)	17.7(0.6)
	Grade 11	1990	18.0(0.6)	17.7(0.3)	17.9(0.3)	17.7(0.4)
		1988	17.4(0.5)	18.2(0.6)	17.8(0.3)	18.7(1.1)
		1984	16.5(0.3)	18.6(0.6)	16.9(0.5)	20.2(1.3)
Number of Errors	Grade 4	1990	7.2(0.7)	4.4(0.2)	6.4(0.5)	4.7(0.3)
		1988	5.0(0.6)	5.0(0.3)	5.7(0.5)	4.9(0.4)
		1984	5.9(0.4)	4.3(0.2)	6.1(0.5)	4.5(0.2)
	Grade 8	1990	8.3(0.7)	6.8(0.3)	8.8(0.4)	6.0(0.3)
		1988	7.0(0.8)	6.1(0.2)	6.9(0.4)	5.6(0.2)
		1984	7.6(0.7)	5.3(0.2)	7.3(0.4)	5.1(0.3)
	Grade 11	1990	8.5(0.6)	6.6(0.2)	8.1(0.5)	6.0(0.3)
		1988	6.1(0.4)	5.1(0.4)	5.1(0.4)	5.6(0.5)
		1984	6.6(0.6)	5.6(0.2)	5.8(0.3)	6.3(0.4)
Error Rate	Grade 4	1990	13.8(0.8)	18.8(1.0)	12.1(0.8)	19.0(1.0)
		1988	9.9(0.6)	20.0(1.7)	9.0(0.6)	19.4(1.6)
		1984	12.6(0.7)	16.5(0.7)	10.2(0.8)	16.4(0.7)
	Grade 8	1990	7.1(0.5)	11.0(0.4)	7.7(0.3)	12.0(0.5)
		1988	6.6(0.9)	9.8(0.4)	7.2(0.4)	11.5(0.5)
		1984	8.7(0.8)	9.2(0.4)	7.5(0.4)	10.8(0.7)
	Grade 11	1990	6.1(0.4)	8.1(0.4)	6.1(0.3)	9.1(0.6)
		1988	4.7(0.3)	6.6(0.5)	4.3(0.3)	8.6(0.6)
		1984	5.5(0.7)	7.2(0.2)	5.1(0.3)	9.6(0.5)

NAEP 1990 NATIONAL WRITING TREND ASSESSMENT— GRADES 4, 8, AND 11

Trends in Sentence Errors for Good and Poor Papers

			Task Accomplishment		Overall Fluency	
		Year	Good Papers (Primary Trait) 3+4	Bad Papers (Primary Trait) 1+2	Good Papers (Holistic) 4,5+6	Bad Papers (Holistic) 1,2+3
Percentage Run-on Sentences	Grade 4	1990	17.1(2.8)	17.5(2.0)	12.5(2.7)	19.1(2.1)
		1988	16.0(4.2)	17.3(2.8)	7.1(1.9)	20.1(2.8)
		1984	17.9(2.9)	14.4(1.7)	13.2(2.7)	15.7(1.6)
	Grade 8	1990	6.8(2.5)	10.0(1.0)	5.4(1.2)	11.9(1.3)
		1988	7.5(4.5)	7.8(1.3)	6.2(1.7)	9.1(1.8)
		1984	4.8(1.6)	7.6(1.0)	3.9(0.9)	9.6(1.7)
	Grade 11	1990	4.5(1.6)	5.6(0.9)	3.7(0.7)	6.3(1.3)
		1988	2.0(0.5)	4.4(1.2)	1.4(0.3)	8.7(2.7)
		1984	2.9(0.8)	4.9(0.8)	3.3(0.9)	8.1(2.2)
Percentage Fragments	Grade 4	1990	3.6(0.8)	4.4(0.8)	3.6(0.9)	4.4(0.9)
		1988	3.4(1.3)	5.4(1.5)	3.3(1.3)	5.2(1.4)
		1984	2.9(0.8)	3.3(0.6)	1.6(0.6)	3.5(0.5)
	Grade 8	1990	1.0(0.5)	3.9(0.4)	1.8(0.3)	4.4(0.6)
		1988	0.7(0.5)	3.9(0.6)	2.4(0.6)	4.8(1.0)
		1984	6.0(2.2)	2.8(0.5)	2.8(0.7)	2.9(0.7)
	Grade 11	1990	1.3(0.4)	3.0(0.5)	1.4(0.3)	3.8(0.7)
		1988	2.2(0.9)	2.7(0.6)	2.2(0.6)	3.4(1.1)
		1984	3.9(1.5)	2.8(0.4)	2.7(0.6)	5.5(1.5)
Percentage Sentences with Agreement Errors	Grade 4	1990	3.3(1.0)	3.7(0.8)	3.0(1.0)	3.9(0.6)
		1988	0.9(0.5)	3.1(0.7)	1.1(0.5)	2.8(0.7)
		1984	4.1(1.5)	3.2(0.6)	4.1(1.5)	3.4(0.8)
	Grade 8	1990	4.1(1.6)	3.5(0.6)	2.1(0.5)	4.3(0.8)
		1988	0.9(0.5)	2.6(0.5)	2.0(0.5)	3.0(0.8)
		1984	4.7(1.8)	2.9(0.7)	3.1(0.7)	3.7(1.0)
	Grade 11	1990	2.2(0.5)	2.6(0.4)	2.3(0.3)	2.7(0.5)
		1988	1.3(0.4)	1.8(0.4)	1.1(0.2)	2.6(0.7)
		1984	1.3(0.4)	3.0(0.6)	1.3(0.4)	4.4(1.5)
Percentage Awkward Sentences	Grade 4	1990	31.1(3.3)	35.9(2.0)	32.8(3.2)	35.3(2.2)
		1988	25.2(3.4)	33.6(3.1)	29.3(4.7)	32.2(3.1)
		1984	21.4(3.2)	26.9(2.3)	21.5(3.7)	26.0(2.5)
	Grade 8	1990	35.5(3.0)	40.5(1.6)	38.8(1.6)	40.8(2.1)
		1988	36.5(7.2)	38.1(2.1)	30.6(2.0)	42.6(2.7)
		1984	22.8(3.5)	33.6(1.8)	23.1(2.3)	38.6(2.8)
	Grade 11	1990	36.7(2.5)	38.1(1.9)	36.2(1.6)	38.7(2.6)
		1988	21.1(1.6)	25.0(1.7)	19.4(1.6)	31.3(2.2)
		1984	24.8(2.1)	32.6(2.0)	23.0(1.7)	39.3(3.9)

NAEP 1990 NATIONAL WRITING TREND ASSESSMENT— GRADES 4, 8, AND 11

Trends in Word-Level Errors for Good and Poor Papers

			Task Accomplishment		Overall Fluency	
		Year	Good Papers (Primary Trait) 3+4	Bad Papers (Primary Trait) 1+2	Good Papers (Holistic) 4,5+6	Bad Papers (Holistic) 1,2+3
Percentage misspelled words	**Grade 4**	1990	7.5(0.6)	9.6(0.7)	5.6(0.5)	10.1(0.7)
		1988	4.8(0.6)	10.8(0.9)	4.2(0.5)	10.5(0.9)
		1984	7.0(0.6)	8.9(0.5)	5.0(0.8)	8.9(0.5)
	Grade 8	1990	2.5(0.3)	4.4(0.3)	2.6(0.2)	5.1(0.4)
		1988	2.5(0.7)	4.1(0.2)	2.7(0.2)	5.0(0.3)
		1984	4.0(0.6)	3.6(0.2)	3.1(0.2)	4.3(0.4)
	Grade 11	1990	1.8(0.2)	3.2(0.4)	1.8(0.1)	3.9(0.6)
		1988	1.5(0.2)	2.1(0.2)	1.4(0.2)	2.9(0.3)
		1984	2.0(0.5)	2.4(0.1)	1.5(0.1)	3.7(0.4)
Percentage word choice errors	**Grade 4**	1990	0.6(0.1)	0.5(0.1)	0.4(0.1)	0.6(0.1)
		1988	0.3(0.1)	0.7(0.1)	0.5(0.1)	0.6(0.1)
		1984	0.6(0.1)	0.8(0.1)	0.7(0.2)	0.8(0.1)
	Grade 8	1990	0.4(0.1)	0.6(0.1)	0.5(0.1)	0.7(0.1)
		1988	0.4(0.1)	0.7(0.1)	0.5(0.1)	0.8(0.1)
		1984	0.7(0.1)	0.7(0.1)	0.6(0.1)	0.8(0.1)
	Grade 11	1990	0.4(0.1)	0.5(0.1)	0.4(0.0)	0.6(0.1)
		1988	0.3(0.1)	0.6(0.1)	0.3(0.0)	0.9(0.1)
		1984	0.4(0.1)	0.7(0.1)	0.6(0.1)	0.7(0.1)
Percentage capitalization errors	**Grade 4**	1990	0.3(0.1)	0.9(0.2)	0.3(0.1)	0.8(0.2)
		1988	0.2(0.1)	0.7(0.4)	0.1(0.0)	0.7(0.4)
		1984	0.3(0.1)	0.5(0.1)	0.2(0.2)	0.5(0.1)
	Grade 8	1990	0.2(0.1)	0.3(0.1)	0.1(0.0)	0.4(0.1)
		1988	0.2(0.1)	0.2(0.0)	0.1(0.0)	0.2(0.1)
		1984	0.2(0.1)	0.3(0.1)	0.2(0.0)	0.3(0.1)
	Grade 11	1990	0.1(0.0)	0.1(0.0)	0.1(0.0)	0.2(0.0)
		1988	0.0(0.0)	0.1(0.1)	0.1(0.1)	0.2(0.1)
		1984	0.1(0.1)	0.1(0.0)	0.0(0.0)	0.1(0.1)

NAEP 1990 NATIONAL WRITING TREND ASSESSMENT—GRADES 4, 8, AND 11

Trends in Punctuation Errors for Good and Poor Papers

			Task Accomplishment		Overall Fluency	
		Year	Good Papers (Primary Trait) 3+4	Bad Papers (Primary Trait) 1+2	Good Papers (Holistic) 4,5+6	Bad Papers (Holistic) 1,2+3
Total punctuation errors per 100 words	**Grade 4**	**1990**	2.4(0.2)	3.4(0.4)	2.6(0.4)	3.1(0.3)
		1988	1.7(0.2)	3.7(0.5)	1.8(0.2)	3.5(0.5)
		1984	1.8(0.2)	2.9(0.3)	1.7(0.3)	2.8(0.2)
	Grade 8	**1990**	1.4(0.2)	2.1(0.1)	1.7(0.1)	2.1(0.2)
		1988	1.3(0.2)	1.8(0.1)	1.5(0.1)	1.9(0.2)
		1984	1.5(0.2)	1.8(0.1)	1.6(0.1)	2.1(0.2)
	Grade 11	**1990**	1.3(0.2)	1.5(0.1)	1.4(0.1)	1.6(0.1)
		1988	1.3(0.2)	1.9(0.4)	1.2(0.1)	2.1(0.2)
		1984	0.9(0.1)	1.7(0.1)	1.2(0.1)	2.0(0.3)
Punctuation omitted per 100 words	**Grade 4**	**1990**	2.3(0.2)	3.2(0.4)	2.4(0.3)	3.0(0.3)
		1988	1.6(0.2)	3.5(0.5)	1.6(0.2)	3.3(0.5)
		1984	1.6(0.3)	2.6(0.2)	1.7(0.3)	2.5(0.2)
	Grade 8	**1990**	1.0(0.1)	1.8(0.1)	1.3(0.1)	1.8(0.2)
		1988	1.1(0.2)	1.4(0.1)	1.1(0.1)	1.5(0.2)
		1984	1.2(0.2)	1.4(0.1)	1.2(0.1)	1.6(0.2)
	Grade 11	**1990**	1.1(0.1)	1.2(0.1)	1.1(0.1)	1.3(0.1)
		1988	1.0(0.1)	1.5(0.4)	0.9(0.1)	1.6(0.2)
		1984	0.6(0.1)	1.3(0.1)	0.9(0.1)	1.5(0.3)
Wrong punctuation per 100 words	**Grade 4**	**1990**	0.1(0.1)	0.2(0.0)	0.2(0.1)	0.1(0.0)
		1988	0.1(0.0)	0.2(0.1)	0.2(0.1)	0.2(0.0)
		1984	0.2(0.1)	0.3(0.1)	0.0(0.0)	0.3(0.1)
	Grade 8	**1990**	0.3(0.1)	0.3(0.0)	0.3(0.0)	0.3(0.1)
		1988	0.2(0.1)	0.4(0.1)	0.4(0.1)	0.4(0.1)
		1984	0.4(0.1)	0.5(0.1)	0.4(0.1)	0.5(0.1)
	Grade 11	**1990**	0.2(0.1)	0.3(0.0)	0.3(0.0)	0.3(0.0)
		1988	0.3(0.1)	0.4(0.1)	0.3(0.0)	0.5(0.1)
		1984	0.3(0.1)	0.4(0.1)	0.3(0.1)	0.5(0.1)

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